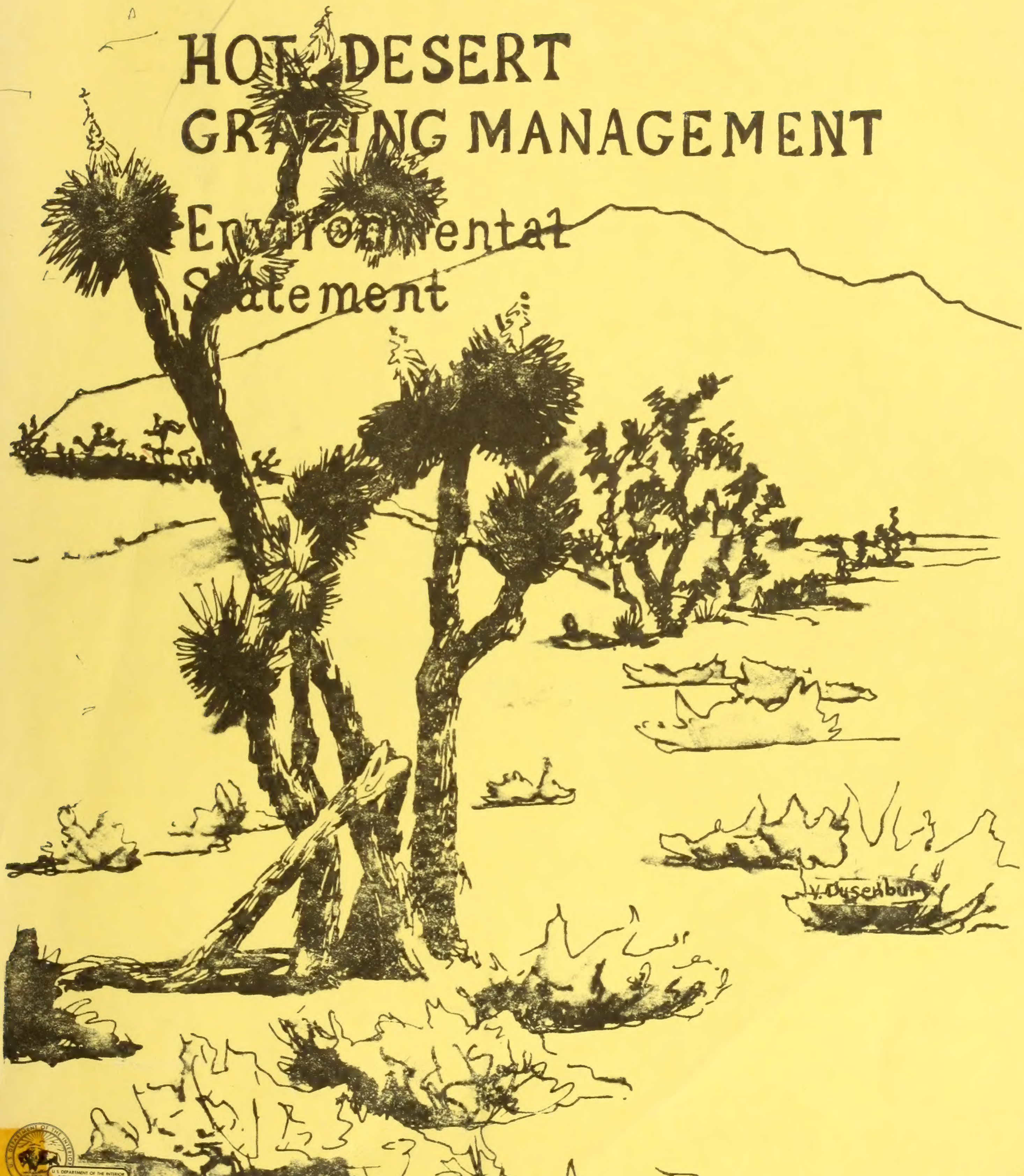
Final

HOT DESERT GRAZING MANAGEMENT

Environmental Statement



UNITED STATES DEPARTMENT OF THE INTERIOR

Bureau of Land Management

DEPARTMENT OF THE INTERIOR

FINAL

ENVIRONMENTAL STATEMENT

ON

GRAZING MANAGEMENT

IN THE

DIXIE RESOURCE AREA

HOT DESERT

PREPARED BY

BUREAU OF LAND MANAGEMENT

DEPARTMENT OF THE INTERIOR

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DIRECTOR, BUREAU OF LAND MANAGEMENT

SUMMARY

( ) Draft (X) Final Environmental Statement

Department of the Interior, Bureau of Land Management

1. Type of Action: (X) Administrative ( ) Legislative

2. Brief Description of Action: Livestock grazing management plans are proposed on 529,564 acres of public land in Washington County, Utah to provide sustained, long term, productive use of the natural resources. Objectives of the proposed action are: (1) to prevent continued decline of soil, water, and the vegetative resources; (2) to improve desired vegetative density and vigor; (3) to enhance wildlife habitat, including that for deer, desert tortoise, and quail; (4) to reduce soil loss from erosion; and (5) to provide long-term stability to the domestic livestock industry. These objectives would be accomplished by implementing 42 Allotment Management Plans (AMPs), 14 Custodial Management Plans, and 3 plans to eliminate grazing. Four basic grazing systems are proposed. They include: (1) systems that incorporate at least a 1-year rest period as a primary treatment on 401,271 acres involving 17,569 AUMs, (2) systems that delay grazing on a portion of the allotment each year during the growing period and rotate this delay among pastures on 46,172 acres involving 1,672 AUMs, (3) systems that delay grazing each year until after the growing period on a particular pasture on 25,533 acres involving 446 AUMs, and (4) systems involving season-long use primarily during the winter period on 20,546 acres involving 617 AUMs.

To facilitate these management systems, range developments such as cattleguards, fences, water developments, seedings and chainings would be needed. A monitoring and evaluation plan is included in the proposed action to assure management objectives are accomplished.

3. Summary of Environmental Impacts: In the long term, herbaceous forage would improve, resulting in a 10 to 20-percent reduction of soil loss, enhancement of wildlife habitat, and an increase in livestock forage production from 20,767 AUMs to 26,389 AUMs after 24 years of intensive management.

In the short term, adverse impacts on specific sites would result from livestock grazing pastures in the spring, resulting in the vegetation not completing growth requirements, livestock grazing in competition with deer on critical winter ranges, livestock operations receiving reductions in stocking rates and reduction in riparian vegetation around new water developments. Some of the identified adverse impacts would be mitigated by changes in the proposed action.

4. Alternatives Considered:

   a. Elimination of all livestock grazing
   b. No action
   c. Restricted grazing during growing season
   d. Limited livestock grazing during first grazing cycle
   e. Delayed implementation of the proposed action
   f. Increased potential livestock production
   g. Reduction of impacts on selected allotments

5. Comments Have Been Requested From the Following: (See Attachment).

6. Date Statement Made Available to EPA and the Public:

   Draft: 19 May 1978
   Final:

   SEP 27 1978

FEDERAL AGENCIES

Forest Service
Geological Survey
Fish and Wildlife Service
Bureau of Outdoor Recreation
Environmental Protection Agency
National Park Service
Bureau of Reclamation
Solicitor
Soil Conservation Service
Advisory Council on Historic Preservation

STATE AGENCIES

Utah State Clearinghouse
Utah State Historic Preservation Officer
State Engineer
Division of State Parks
Division of Wildlife Resources
Division of Lands
Office of Planning and Coordination
Division of Natural Resources
Utah State University

LOCAL AGENCIES

Washington County Commissioners
Five-County Association of Governments

INDIVIDUALS

James Morgan
Present Range Permittees

INTEREST GROUPS

Utah Cattlemen's Association
Utah Woolgrowers Association
Sierra Club
Wildlife Federation
Natural Resources Defense Council
ISSUE
Friends of the Earth
Water Conservation District
Utah Environment Center
Utah Mining Association
National Parks and Recreation Association
American Horse Protection Association, Inc.
Zion First National Bank, St. George, Utah
Desert Tortoise Council
National Council of Public Land Users
Ada County Fish and Game League

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CHAPTER 1

DESCRIPTION OF PROPOSED ACTION

CHAPTER 1
DESCRIPTION OF PROPOSED ACTION

INTRODUCTION

Background. In 1974, in response to a suit filed by several conservation groups, a Federal court declared that a programmatic grazing Environmental Statement (ES) prepared by the Bureau of Land Management (BLM) was not sufficient to comply with the provisions of the National Environmental Policy Act (NEPA) of 1969. The court directed BLM to reach an agreement with the plaintiffs to prepare the necessary statements needed to comply with NEPA. In a final judgment issued during 1975, the Federal court ordered BLM to prepare 212 separate site-specific statements concerning the effect of livestock grazing activities on public lands. In these statements, BLM was directed to address specific areas and identify particular grazing management programs, analyze environmental impacts, and propose management alternatives.

The Hot Desert area in southwestern Utah was designated as the first location in Utah to be covered by a grazing environmental statement. This area covers more than half of Washington County and encompasses most of the BLM Virgin River Planning Unit. Figure 1-1 shows the location and extent of the area covered by this environmental statement in relation to the State of Utah.

Public lands contained within the boundary lines of this ES are administered by BLM from a district office located in Cedar City, Utah. An area field office is located at St. George, Utah.

A small portion of public lands located in Arizona and contiguous to public lands in Utah, is included in the statement area because designated grazing allotments assigned to range users in the Hot Desert area cover both sides of the Utah-Arizona State line. The grazing use of these Arizona lands would be administered by the Cedar City District.

Historically, the area has been grazed since the 1850s when the region was settled by pioneers. Early grazing was uncontrolled because

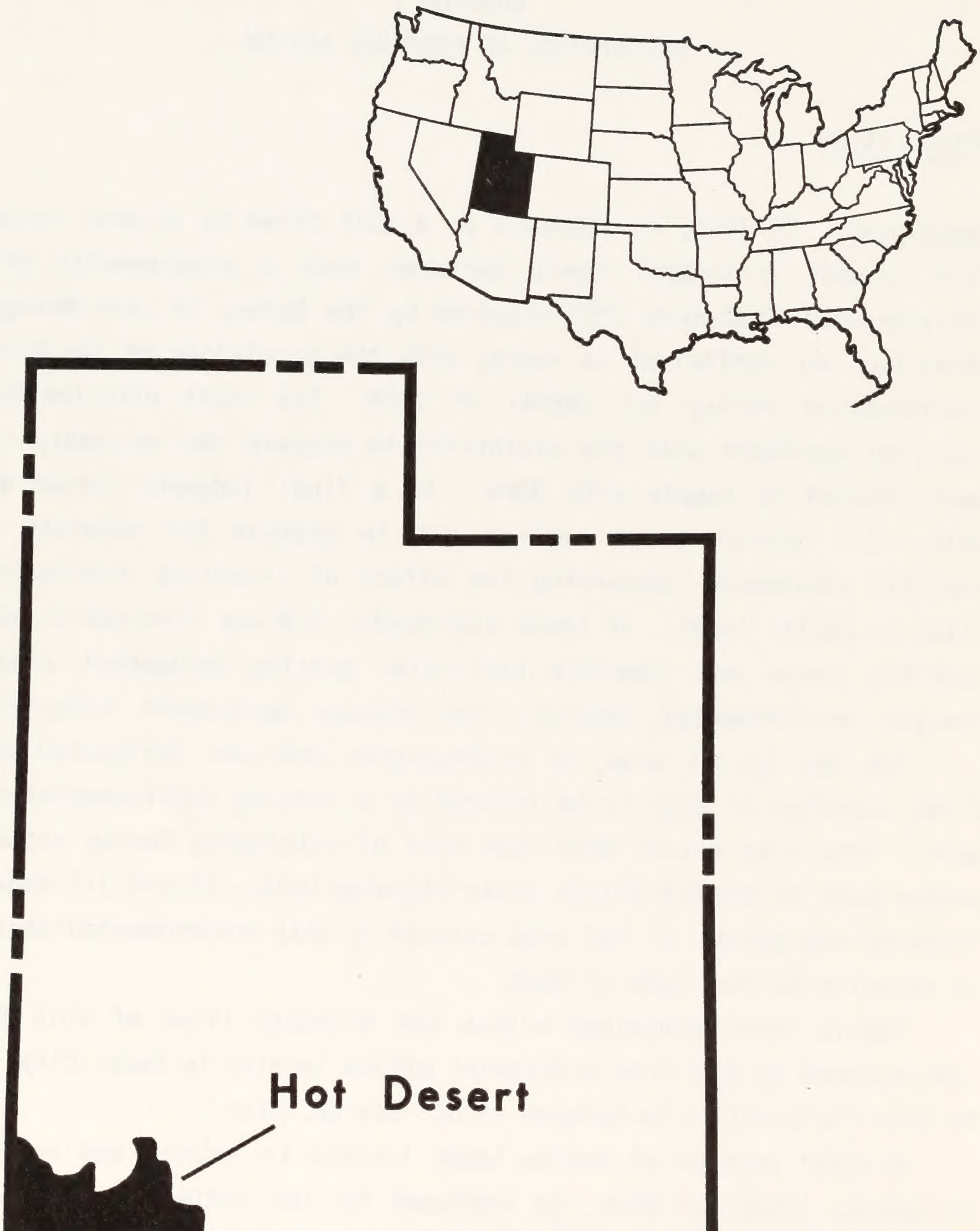


Figure 1-1
HOT DESERT LOCATION MAP

there were no restrictions on the number of livestock or areas where grazing could take place. The first areas to be grazed were those near the pioneer settlements and those near water sources. Most livestock operators had little or no privately controlled pasture land and relied on public land to supply all the forage needed to sustain their animals. While most operators had selected areas they preferred to graze, some operators regularly trailed their animals from one forage or water source to another. Overuse of the vegetation became common. With time, grazing of domestic stock became more organized; water sources were developed and fences were erected in an effort to control forage utilization and distribution of livestock.

Since the passage of the Taylor Grazing Act in 1934, public lands have been administered by the Department of the Interior, Bureau of Land Management (and its early predecessor, the Grazing Service). This Act provided for control and organization of grazing on public lands, as well as a means of equitably allocating forage to qualified range users.

In Washington County, most range users conduct year-round livestock operations. Such operations require that a user have other grazing land to supplement his privately owned range land.

Purpose and Need. This statement focuses primarily on the proposed grazing management activities in Washington County; however, since the proposed grazing action is only one of several multiple use activities being conducted on public lands in the area, all of the various land uses are identified and discussed in this ES.

The purpose of the proposed action - the implementation of a grazing management program - is to maintain or improve public land resources such as soil, water, vegetation, and wildlife through the use of grazing management. As required by law (Taylor Grazing Act, 1934, Classification and Multiple Use Act, Public Law 88-6071, 1964, and the Federal Land Policy and Management Act of 1976), BLM is responsible for management "in a manner that will protect the land and its resources from destruction or unnecessary injury, stabilize the livestock industry dependent on public lands, and provide for the orderly use, improvement,

development, and rehabilitation of the public lands for livestock grazing consistent with multiple use, sustained yield, environmental, economic, and other objectives" (4100.0-2 Grazing Regulations).

The statement provides for analysis of the proposed management program, identifies impacts on the environment, and addresses possible mitigating measures to reduce any adverse impacts. Another important purpose of this statement is the development and analysis of alternatives to the proposal. Public input, which is a part of the analysis and data gathering process, is required to adequately inform BLM managers of public objectives, goals, and desires concerning this proposed action.

The following five assumptions were made by BLM concerning this proposed action and the resulting analysis:

1. Use of public land for livestock production is in conformance with multiple use principles and is in keeping with the congressional declaration to manage the public lands to meet the Nation's need for domestic sources of minerals, food, and fiber, and protect the quality of the environment as well as provide habitat for wildlife and recreation opportunities.

2. Proposed grazing management systems would be implemented over the 5-year period immediately following completion of the final environmental statement.

3. That BLM would receive sufficient funding to carry out the necessary improvements to implement the proposed action within the specified time frame.

4. Necessary staffing would be made available to carry out the related studies, monitoring, and evaluation required for the grazing management systems.

5. That BLM would receive sufficient funding to maintain existing improvements, maintain new improvements, and carry out valid recommendations made as a result of continuing studies and monitoring programs.

PROPOSED ACTION

Fundamental Grazing Characteristics. Specific grazing management programs are proposed that incorporate fundamental livestock grazing characteristics. A review of these fundamentals is needed to understand the proposed action and the rationale for its development. Animal use characteristics are discussed because they are change agents that affect impacts of the proposal on vegetation.

Animal Use Characteristics. This discussion basically addresses cattle since they consume approximately 97 percent of the forage utilized by livestock in the area. Although other kinds of livestock (sheep and goats, etc.) behave differently, most of the following factors are also important in their management.

Cattle graze the range selectively by species and area (Hormay, 1970), grazing the most palatable and nutritious plants, and regrazing the same plants to enjoy the new leafy regrowth that develops. Selectivity for forage is seasonal and depends on such factors as nutritional quality, palatability, and availability of forage (Bell, 1973 and Stoddart et al., 1975).

The actual plants preferred in any given range are a function of these factors and the quality of surrounding forage. Even where abundant forage is present, cattle graze a few plants more than others. Certain plants are always grazed more heavily than other forage plants in the community regardless of the number of cattle on the range (Bell, 1973).

Since most of the Hot Desert ES area is characterized by rough topography, most of the current use is occurring in drainage bottoms, especially if water is present. The wide variety of vegetation and climatic conditions cause utilization and distribution to be irregular. Water for livestock is limited and, as Bell (1973) indicates, areas near water are usually heavily utilized.

The grazing systems contained in the proposal incorporate livestock grazing habits in their design. The purpose of the systems is to

regulate livestock use of the plants in order to provide sustained production of both the forage resource and livestock.

Specific Components of the Proposal. The proposed action includes the following components:

1. Eliminate livestock grazing from areas where the resources or uses are not capable of sustaining such activity.

2. Authorize livestock grazing use of 463 AUMs at a low level of management (custodial management, see Glossary G-3).

3. Authorize intensive livestock management of 20,304 AUMs under high-level management through implementation of AMPs which include grazing systems, construction of range improvements, and a program of studies and evaluation.

4. Continue no grazing use on areas where grazing is presently not authorized.

Inherent in all of these components would be the adjustment of livestock grazing to the capability of the range to produce forage on a sustained yield basis.

Table 1-1 shows the various components of the proposal and their size in terms of acres and animal unit months (AUMs) of forage.

The present, proposed, and potential stocking rates by existing and proposed allotments can be found in Appendix I.

Development of range facilities such as fences and water sources would be necessary to assist in the establishment of the proposed management components.

No developments are planned to implement the custodial management and elimination of grazing components.

Retention of the currently unallotted lands would necessitate no range developments and require no specific range management objectives. Supervision of these small tracts would be limited to trespass control. Since no grazing is proposed for these areas, they will not be discussed further.

The proposed action would combine the 84 existing allotments into 59 allotments. Forty-two of the new allotments have intensive grazing

TABLE 1-1

Components of the Proposal and Affected Public Land

Proposed Action (Components)	Public Resource Land: Acres	Percent of Management Components	Normal Operation AUMs[a]
Elimination of grazing (3 allotments)	13,505	3	0[b]
Custodial management[c] (22 allotments[d])	22,537	4	463
Intensive livestock management (42 allotments)	493,522	93	20,304
Total public land with management plans	529,564	100	20,767
Unallotted status (landfills, recreation sites, rights-of-way, natural areas, isolated tracts)	21,835	...	......
Total public land within ES boundary	551,399	...	......

[a]AUM = Animal Unit Month. The amount of forage required to sustain the equivalent of one cow or five sheep for 1 month, the equivalent of 800 pounds of usable forage per acre.

[b]Sixty three AUMs of livestock forage available. Not allocated in normal operation.

[c]See Glossary.

[d]Includes eight allotments having both intensive and custodial management components and 14 custodial management allotments.

management systems (AMPs) proposed, 14 allotments are proposed for custodial management, and 3 allotments would eliminate livestock grazing (fig. 1-2 in pocket inside back cover). The proposed action would modify the existing management and level of grazing use in the area. Basically, the proposal would involve the following:

Combination of Smaller Allotments. Resource values, physical barriers, potential for improvements, economics, and existing use were considered in order to reach the best possible combination for intensive management.

Adjustment in Current Levels of Grazing. Quality and amount of vegetation, resource conditions, and season of use were considered.

Changes in Season of Use. Needs of vegetative resources and operator objectives were considered.

Implementation of Grazing Management Systems. AMP objectives such as resource conditions, opportunities for improvement, operator objectives, and management goals were considered.

The proposed action would require increased management and supervision of public land as well as increased cooperation between BLM and the range users. Administration and management of the proposal would be accomplished through standard BLM licensing and operating procedures.

The following schematic (fig. 1-3) shows how the proposed action evolved; it also shows the position of this environmental statement in relation to the management process on public land.

The objectives of the Bureau's Planning System Management Framework Plan (MFP) and Allotment Management Plan (AMP) for long-term sustained productivity of livestock forage and improvement of watershed and wildlife resources are estimated to be reached 24 years after implementation. This time span of 24 years would allow for several repetitions of the grazing cycle (alternate periods of grazing and resting) on all allotments, which would result in visible improvement of resource conditions.

Once initiated, management of the proposals would be dynamic. If changes would be needed, as indicated by evaluation and monitoring studies, the proposal would be modified and a supplementary environmental assessment would be prepared for each modification.

It is the intention of BLM that this grazing proposal be the primary range management effort in the Washington County area to provide a sustained long-term productive use of public land.

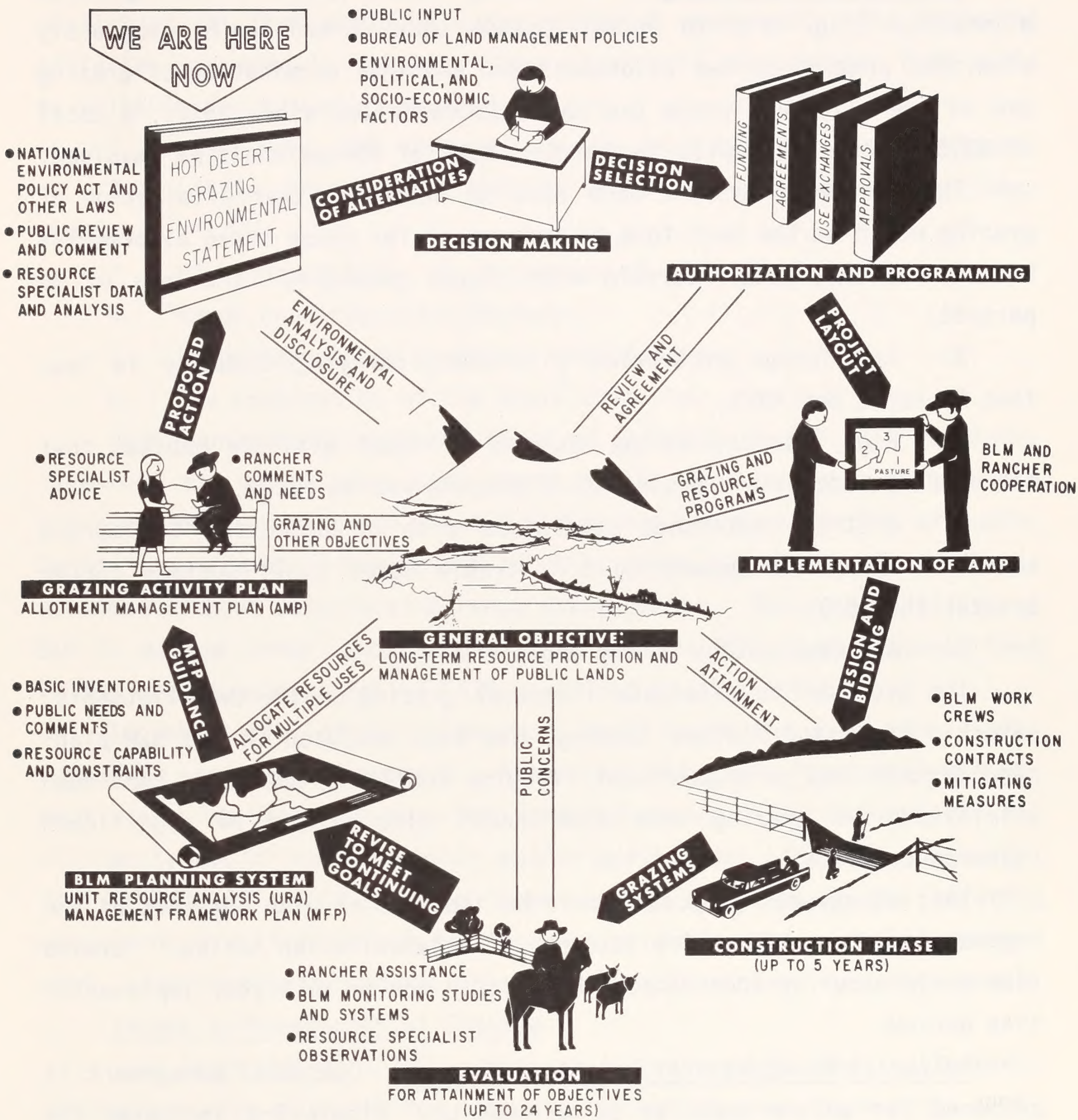


Figure 1-3

EVOLUTION OF PROPOSED ACTION

Proposed Action

Elimination of Grazing. This management proposal affecting three allotments (fig. 1-2 in pocket inside back cover) would completely eliminate grazing on two allotments and continue termination of grazing use on one allotment where use has been cancelled since 1967. A total of 13,505 acres of public land and 63 AUMs of forage would be involved.

The following factors were used to determine that elimination of grazing would be the best form of management for these three allotments:

1. Steep, rough terrain with slopes generally in excess of 40 percent;

2. Low forage production (livestock carrying capacity is less than 50 acres per AUM);

3. High resource values such as critical wildlife habitat that could not be adequately protected if grazing was to occur;

4. Critical watershed conditions with no potential to improve under livestock management to a tolerable level (soil surface factor greater than 60);

5. Any combination of the above.

The proposal to eliminate livestock grazing on the two allotments, LaVerkin Creek and Pintura Seeding, has been analyzed in the BLM planning process and no significant resource conflicts emerged. Continued elimination of grazing from Pace Knoll also showed no significant resource conflicts.

This management proposal would be implemented with the rest of the components; it would require issuance of a cancellation notice. Termination would occur as soon as possible within the 1- to 5-year implementation period.

Custodial Management of Livestock Grazing. Custodial management is proposed for all or part of 22 allotments. Figure 1-2 indicates the specific allotments for which custodial management is proposed. Of the 22 allotments, 8 are included within the AMPs, containing 221 AUMs on 12,340 acres and 14 are solely custodial involving 242 AUMs and 10,197 acres. In most instances, the proposed custodial management allotments

consist of scattered tracts of public land interspersed with large tracts of private land. In addition, certain proposed AMPs include small pastures that would be under custodial management. The following criteria were used to identify those allotments and pastures that would be suitable for custodial management:

1. Less than 100 AUMs of forage available on the allotment;
2. Little identified conflict with resource uses other than grazing;
3. High percentage of interspersed private and State lands;
4. Range condition satisfactory;
5. Range management practices satisfactory;
6. Any combination of the above criteria.

This management component does not propose an AMP. It regulates livestock use on a range area where public land is interspersed with private land, assuring the trust guardianship and preservation of public lands are upheld. Objectives of this type of management might be attained without constructing range developments. The responsibility of BLM to manage these lands according to Section 302 of the Federal Land Policy and Management Act of 1976 would not be diminished.

Implementation of this component would begin the same year as the intensive management component. Most allotments under custodial management would utilize a season-long grazing system. The majority of the allotments would involve winter and/or spring use. Four of the custodial allotments would involve summer use. A change in the existing management practices would be required to implement custodial management; adjustments in seasons of use and grazing intensity are proposed.

Intensive Management of Grazing

Introduction. This component is proposed for those allotments determined to be suitable for intensive livestock management (fig. 1-2). Intensive management differs from the custodial management and elimination of grazing components in terms of intensity and management objectives. Proposed allotment management plan objectives are shown in Appendix II.

DESCRIPTION OF PROPOSAL

The objectives of the grazing systems are to promote an optimum level of livestock use while, at the same time, meeting other resource needs that can be accomplished through livestock management. The purpose of this component is to provide for sustained, long-term utilization of the vegetative resource and it would require completion of range developments such as fences, water sources, and seedings that would promote uniform distribution of livestock and proper utilization of the vegetative resource (Glossary p. G-8).

Major points considered in selecting these grazing systems include:

1. Wildlife. Species present, seasons of use, forage and habitat needs, and critical areas;

2. Watershed. Conditions and soil characteristics;

3. Livestock. Seasons of use, numbers, class of livestock, food preferences, habits, and husbandry needs;

4. Vegetation. Conditions, production, and physiological requirements;

5. Climate. Temperature and precipitation, amount, and occurrence;

6. Topography. Steepness of slope and elevation;

7. Range Developments. Costs of fencing and water developments; existing improvements;

8. Land. Ownership patterns;

9. Recreation. Off-road vehicle use and visual resource management needs.

The goals and resource constraints identified in the Bureau's land use planning process have been incorporated in the proposed grazing systems which are designed to provide a sustained yield of forage while at the same time encouraging the protection of the soil and improvement of vegetative resource.

Intensive livestock management would be implemented by BLM through its AMP program. The AMP prepared for each allotment is a livestock grazing plan that prescribes the conditions and manner of grazing use. Each AMP determines the level of grazing, season of use, and specific

grazing system designed to reach desired goals and objectives. When implemented, the provisions of the AMP become a stipulation of the grazing license. The AMP files are available for public inspection at the Cedar City District Office.

The following steps were used in the preparation of AMPs:

1. Review BLM planning data, collect and analyze additional resource data (e.g,. soils, water, vegetation, wildlife), and contact range users.

2. Identify resource problems (e.g., winter grazing by livestock on crucial winter range for deer).

3. Establish objectives that would enhance the resource and/or resolve resource problems.

4. Develop a grazing system that would accomplish the objectives.

5. Establish location for range developments required for implementing the grazing system.

6. Develop evaluation procedures and conduct studies to determine effects of each grazing system in relation to established objectives.

Each AMP would be evaluated at the conclusion of each grazing cycle using various study procedures to monitor changes in plant composition and ground cover. Four studies are basic to the evaluation: actual grazing use, vegetative utilization, condition and trend (soils and vegetation), and climate.

Intensive livestock management systems have been proposed for 42 allotments involving 493,522 acres and 20,304 AUMs of forage. Allotment management plans have been prepared for each of the 42 allotments. Four basic grazing systems are proposed: (1) systems that incorporate at least a 1-year rest period as a primary treatment; (2) grazing systems that delay grazing on a portion of the allotment each year during the growing period and rotate this delay among the pastures; (3) systems that delay grazing each year until after the growing period on a particular pasture, and (4) systems involving season-long use primarily during the winter period. These four basic systems are outlined below.

Grazing Systems that Incorporate a Rest Period. Systems that incorporate a rest into the grazing schedule are proposed on 401,271 acres and would involve 17,569 AUMs.

This system would entail pastures nearly equally divided in terms of forage production. Each pasture would be systematically grazed and rested over an entire grazing cycle. Grazing treatments would be rotated so that at the end of a cycle each pasture would have received equal treatment, i.e., all pastures would be grazed and rested the same amount of time.

Grazing systems that utilize rest are designed to allow completion of plant growth and fulfillment of reproductive requirements while allowing optimum use of livestock forage. Most of these systems involve grazing during the winter and spring seasons. Three variations of rest systems are proposed for use with three pastures, two pastures or one pasture. Regardless of the number of pastures involved, all systems have scheduled grazing and resting sequences in common.

Three-pasture rest systems are proposed on 21 allotments which would involve 367,895 acres and 16,340 AUMs.

Table 1-2 illustrates how an allotment would receive grazing treatments under a three-pasture rest system. A description of these treatments follows:

First Treatment. The first treatment (A) would involve grazing during the winter period. Grazing in this pasture would be terminated before spring growth begins, usually March 1. The forage harvested by livestock would be dry, mature, and of generally lower quality than forage harvested in the spring. While grazing, livestock would be trampling seeds into the ground from those vegetative species that disseminate their seeds in the late fall.

Second Treatment. The second treatment (B) would consist of grazing a pasture for weight gain and would normally occur during the spring growth period. Forage harvested during this period (primarily grasses) would be highly palatable and nutritious, and would be of higher quality than that consumed during the winter. After being grazed

TABLE 1-2

Three Pasture Rotation-Rest Grazing System

Typical use: Winter to spring (October 16 through May 15)

Treatment	Oct 16	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct 15
A	Graze to scatter and trample seed				Rest to establish seedlings and for plant vigor and litter								
B	Rest to establish seedlings and for plant vigor and litter				Graze for livestock production				Rest for plant vigor and litter				
C	Rest for plant vigor, litter, forage and seed production.												

NOTE: A one-pasture rotation-rest grazing system would work the same way, but treatments would include lands other than public land.

during this period, plants would not be grazed for the remainder of the year.

<u>Third Treatment</u>. The third treatment (C) would follow the spring grazing treatment (B) and would consist of a rest period for at least 1 full year. This rest would allow plants grazed during treatment (B) to complete one entire growth and reproductive cycle before being grazed again the next winter. The purpose of this rest would be to allow desirable plants the opportunity to gain vigor, produce litter, and reproduce.

One of the major values of this system over continuous grazing is better distribution of livestock on the range. Since palatability in plants varies with season, rotation of grazing would allow plants to be used at different periods, resulting in more equal utilization (Stoddart et al., 1975).

Two-Pasture Systems. Two-pasture systems involve grazing during the winter and utilize two treatments: graze, then rest. Essentially this is a "flip-flop" system where one pasture is alternately grazed 1 year and rested the following year. Table 1-3 illustrates application of this rest system which would involve 22,414 acres and 801 AUMs. This system is proposed for small allotments where other grazing systems would not be feasible because of season of use and resource limitations.

TABLE 1-3

Two Pasture Rotation-Rest Grazing System

Typical use: December 1 through February 28

Treatment	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
A	Graze for livestock production, scatter and trample seed			Rest for plant vigor and to establish seedlings								
B	Rest for plant vigor, litter and seed production											

One-Pasture Rest Systems. Proposed one-pasture rest systems involving 10,962 acres and 428 AUMs would be similar to the three-pasture systems proposed except that one entire allotment would be treated as one pasture and would require 3 years to complete the grazing cycle. This proposed system calls for grazing during the winter, then removal of livestock until spring of the following year, and finally no livestock use on the allotment during the third year. The one-pasture system would require that the operator be able to utilize land other than his allotment. Under this three-treatment one-pasture system the results would be the same as the basic three-pasture three-treatment

systems, i.e., at the end of 3 years the allotment would have been grazed once in winter, once in the spring, and rested once. This variation is proposed for use on small allotments where there is limited forage value and the cost of fencing into three small pastures would be prohibitive. This system would be applied in the same manner as shown for the three-pasture rest system (table 1-2).

Grazing Systems That Rotate the Delay of Grazing. Grazing systems are proposed that would delay grazing each year during the growing period on a portion of the allotment and would rotate this delay among pastures during the cycle. Rotation allows other areas of the range to benefit from deferment (Stoddart et al., 1975). If length of deferment is sufficient and deferment occurs during the growing season, some benefit would result to range plants. Even though there may be insufficient moisture for full vegetative growth during such a deferment period, there still would be a relief of pressure from further deterioration of plants, including their root systems (Bell, 1973).

Two system variations of delay-rotation grazing are proposed involving winter-spring use and summer use.

First Variation- Winter-Spring Use. The first variation of the delay and rotation system involving winter-spring use would require two or more pastures, with at least one of the pastures being rested during the spring growing period.

The winter-spring use period variation is proposed on two allotments (Gunlock and Curly Hollow, fig. 1-2), and would involve 27,896 acres and 1,227 AUMs. Terrain and vegetative resources of these two allotments result in an imbalance between pastures and it would not be feasible to develop rotation-rest systems that require nearly equal amounts of forage in all pastures.

The grazing deferral and rest sequences would be rotated among the pastures in a manner similar to that used in the rest systems previously described. Table 1-4 shows how a typical delay-rotation system of the winter-spring variation would work.

TABLE 1-4

Rotation - Delay Grazing System
(First Variation Winter-Spring Use)

Typical use: November 15 through May 15

Treatment	Nov 15	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
A	Graze			Rest to establish seedlings								
B	Rest for plant vigor					Graze		Rest for plant vigor and litter				
C				Graze		Rest for plant vigor and seed production						

Second Variation - Summer Use. The second variation of the proposed delay-rotation grazing system would involve summer use. Grazing in one pasture would not occur during spring growth and would be delayed until after seed ripe time of the key forage species. Delaying grazing would allow desirable forage plants the full benefit of the entire growing season for maximum development (Bell, 1973).

The summer use variation is proposed for higher-elevation allotments (Cougar Canyon and Big Mountain, fig. 1-2) where rough, steep terrain and limited vegetative resources preclude development of rest systems of grazing. There would be 18,276 acres and 445 AUMs involved. Table 1-5 illustrates second variation - summer use.

Grazing Systems That Delay Grazing Each Year Until After Growing Period. These grazing systems would postpone grazing each year until after desirable plants have matured. This system would be similar to the delay-rotation systems described earlier except that the grazing delay occurs on the same area each year and would not be rotated because only one pasture would be involved.

TABLE 1-5

Rotation - Delay Grazing System
(Second Variation Summer Use)

Summer season: May 1 through October 1

Treatment	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
A	Graze for livestock production					Rest to regain plant vigor; plant regrowth						
B	Rest for plant vigor, litter and seed production		Graze to scatter and trample seed			Rest to encourage seedling establishment and rest for plant vigor and litter						

The longer grazing can be delayed, opportunities are improved for new plants to become established and for old plants to gain or maintain vigor. Grazing after seed ripe maturity causes less damage to plants and provides opportunity for animals to scatter and trample seeds into the soil (Stoddart et al., 1975).

The purpose of delayed grazing systems is to postpone grazing in one pasture until after seed ripe time of the key forage species, allowing the plants an opportunity to complete growth and reproductive processes.

This grazing system is proposed for high elevation areas in two allotments where rough terrain would result in excessively high costs to develop such areas for inclusion into the rest systems proposed for the remainder of the allotment. In addition, the high elevation would preclude use during the winter because of heavy snow. Grazing would be

delayed each year until after the seed ripe period of the desirable forage species and would continue for the rest of the summer. Then for the remainder of the year this pasture would not be grazed. Table 1-6 illustrates how a deferred system with summer use would be applied on two allotments, Desert Inn and Twin Peaks, involving 25,533 acres and 446 AUMs.

TABLE 1-6

Delayed Grazing System

Summer season: June 1 through August 31

Treatment	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
A	Rest for plant vigor and production of litter					Graze to scatter and trample seed and for livestock production			Rest for plant vigor and production of litter			

Season-long Grazing Systems. Smaller allotments that would be grazed during the winter have season-long grazing systems proposed. Seven such allotments are proposed with 20,546 acres and 617 AUMs involved.

All allotments would use a one-pasture/one-treatment system for winter grazing each year. The allotments would be rested at times other than during the winter. Table 1-7 illustrates how these allotments would be managed.

TABLE 1-7

Season-Long Grazing System

Winter only: January 1 through February 28

Treat- ment	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
A	Graze for livestock production		Rest for plant vigor and seed production									

RANGE DEVELOPMENTS

Development of Range Facilities. Construction of 11 different types of range facilities would be required for the implementation of the proposal:

Springs	Reservoirs
Pipelines	Fences
Wells	Cattleguards
Rainfall catchments	Trails
Water storage tanks	Seedings (chainings)
Water troughs	

No developments are planned for those areas proposed for custodial management or elimination of grazing. Only those developments considered absolutely necessary are proposed for the initial implementation of the intensive management components. Table 1-8 shows the range of benefit/cost ratios calculated for those allotments having range developments. Developments are designed to provide water for livestock, control movement of livestock, provide additional forage where needed, encourage distribution and enhance proper utilization of available forage. Water developments such as springs, pipelines, wells, and catchments are proposed to provide a source of water to improve distribution on areas where water is presently limited. Various tanks, troughs, and reservoirs would provide storage of water for use by livestock and wildlife. Fences, cattleguards, and a trail are proposed to control movement of livestock. Seedings are proposed so that pastures that are low in forage would be balanced with those having an adequate supply.

A schematic diagram (fig. 1-4) illustrates a typical allotment that has range developments constructed and is under a grazing management system. The diagram shows the relationship between the location and use of range developments. Water facilities are dispersed over the entire unit so that each pasture has an adequate supply. Allotment boundaries and pasture divisions utilize existing natural barriers where possible to reduce fence construction and maintenance.

TABLE 1-8

Range of Benefit/Cost Ratios

Range of Benefit Cost Ratios			Number of Allotments[a]
0.98/1	to	1.3/1	4
1.3/1	to	3/1	20
3/1	to	10/1	7

[a]Because many of the allotments have no proposed improvements, a benefit/cost ratio was not calculated for them, therefore, this column will not total the actual number of allotments.

Design Restrictions. The BLM Cedar City District would require adherence to the following eight restrictions if range developments are constructed in the Washington County area. These design restrictions would be required in order to enhance resource values and reduce adverse impacts caused by construction of range developments.

1. No permanent trails or roads would be constructed to project sites. Existing access would be used.

2. Disturbed areas would be reseeded as soon as possible with a mixture of native and/or introduced species in order to replace ground cover on the sites and minimize losses of soil from wind and water erosion.

3. No clearing of the project sites would be allowed except on sites requiring excavation.

4. Archaeological clearance would be required for all project sites prior to new construction. In addition to assuring that archaeological values would not be impaired, this clearance would conform with the requirements of the Historical Preservation Act and Executive Order 11593.

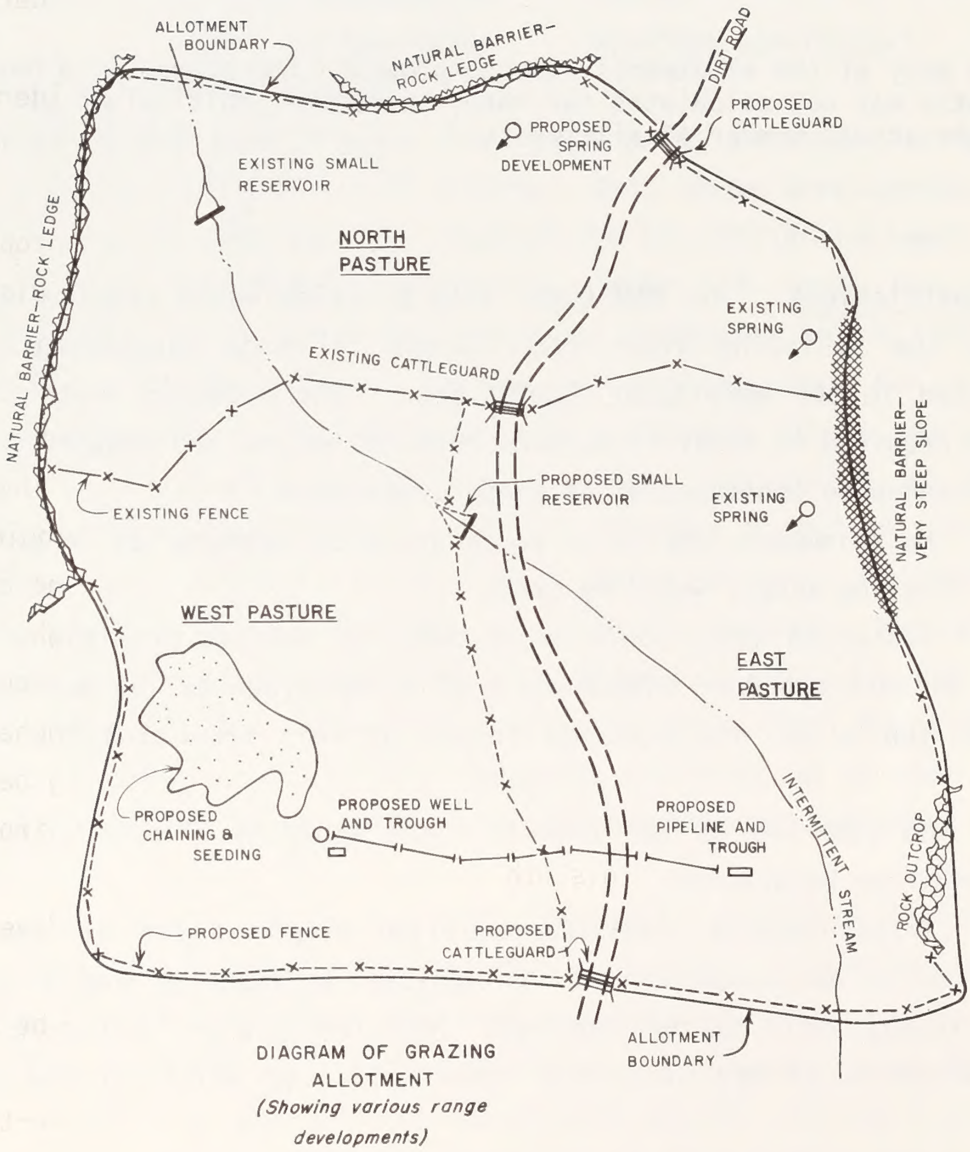


Figure 1-4
TYPICAL GRAZING ALLOTMENT
(showing various range developments)

5. Threatened and endangered species clearance would be required for all project sites prior to new construction.

6. Disturbance at all project sites would be held to an absolute minimum.

7. Where possible, water would be maintained throughout the year at established watering facilities for wildlife.

8. Implementation of any proposed developments that could preclude wilderness designation would be delayed until the wilderness inventory is carried out in the Hot Desert area.

All public land would be looked at during the initial wilderness inventory process. Formal wilderness study will proceed on those lands determined to have wilderness value.

Additional design restrictions specifically applicable to proposed individual range developments are identified in the following discussions:

Specific Range Developments Proposed

Springs. Eighteen spring developments would be required. The normal construction procedure for a point discharge spring would involve backhoe excavation (fig. 1-5). A vertical perforated pipe would be inserted which would function as a collection box. Water would be piped through a small-diameter plastic pipe from the box to the trough. For those sites where water seeps from an area larger than a point source, the gathering devices would be perforated pipes horizontally trenched in the seep. Water would flow through the pipe from the gathering device to a vertical headbox from which it would be piped into the trough. Each spring development would disturb less than .25 acre.

The following design features would be applied to spring developments:

1. Actual development work on and around the spring would be done with hand tools insofar as possible.

2. If machinery was needed, a backhoe mounted on a rubber-tired tractor would be used. Use of a bulldozer, front-end loader, or scraper would not generally be required.

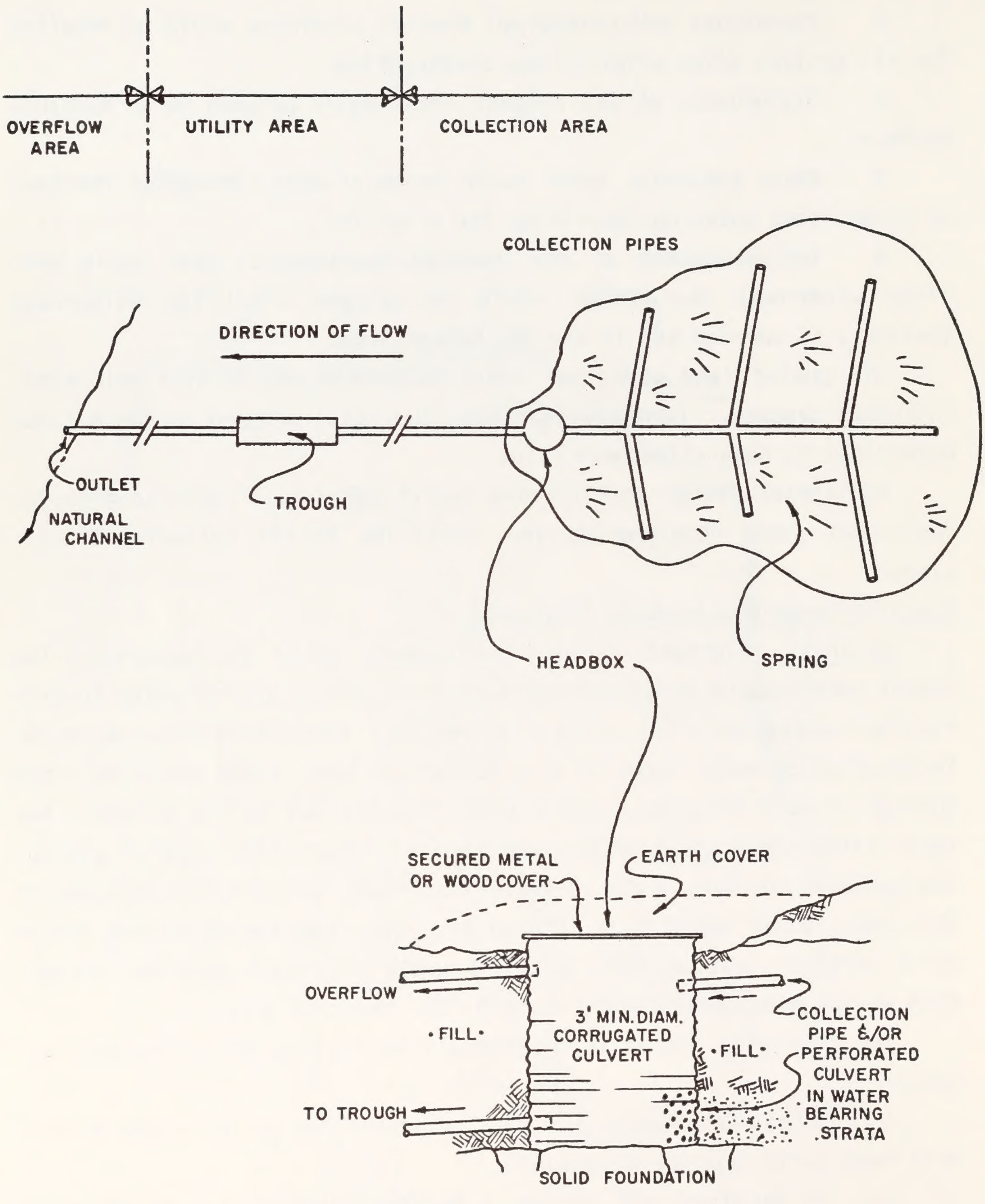


Figure 1-5
TYPICAL SPRING DEVELOPMENT

3. After construction, the work area would be cleared of trash and damaged or excess material, which would be taken to a refuse disposal site.

4. Cuts, fills, and excavations would be dressed and blended with the surrounding area.

5. Disturbed areas with mineral soil showing would be seeded and/or planted with native grass and/or browse to blend with the undisturbed area.

6. Wet areas around springs would be retained whenever physically possible to permit some water flow at the site. This would be accomplished by installing a headbox overflow which would drain into a sump constructed near the spring source. Water sources would be protected by a fence.

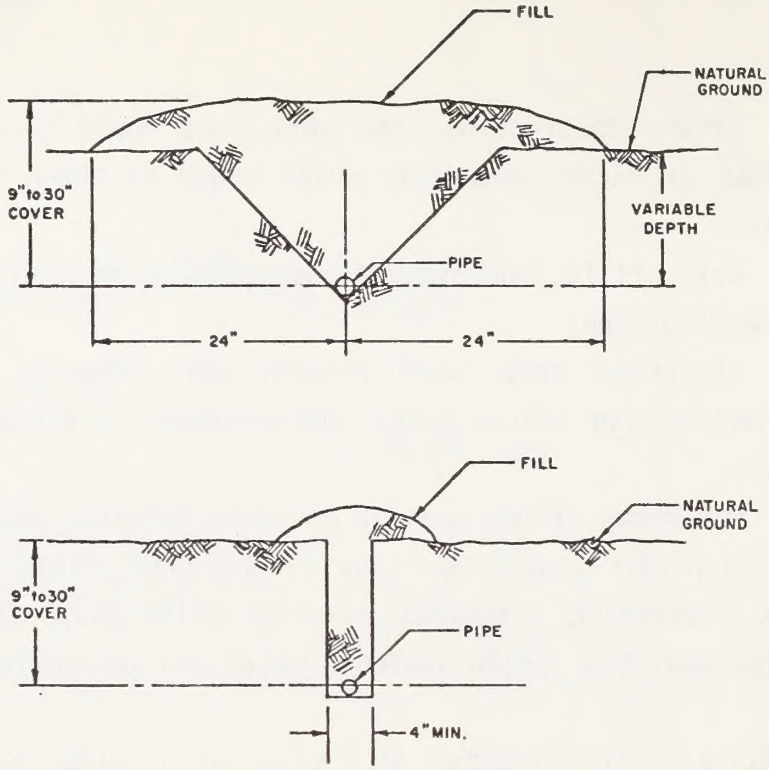
Pipelines. An estimated 44.3 miles of pipeline would be needed to carry water from the source (well, stream, spring, or water catchment) to those areas where livestock drinking water is not presently available.

Installation would entail burial of a small diameter plastic pipe with a "ripper tooth" device mounted on a tractor. Ripping a trench for the pipeline, actual placement, and covering with earth would be done in one operation. Where surface rocks prohibit burial, the pipe would be laid on top of the ground. An estimated 1.2 acres per mile would be disturbed during construction.

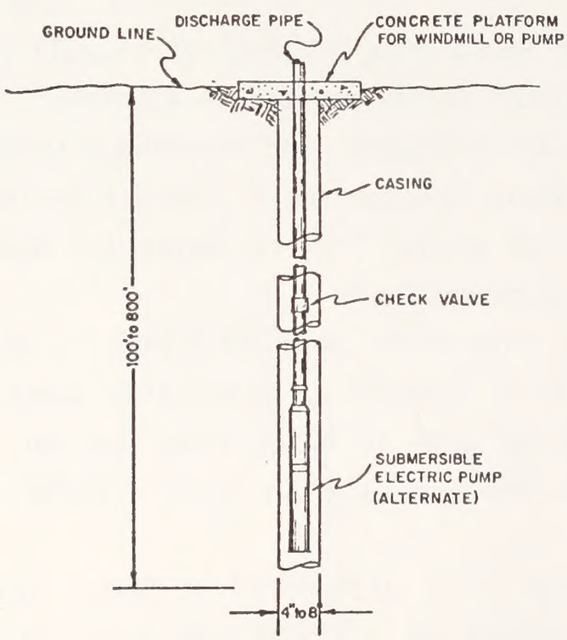
Wells. Two wells would be constructed. Each well would be cased to prevent cave-ins. Windmills, submersible pumps, or pump jacks (piston types) would be used to bring water to the surface. Well sites would be fenced; however, the enclosures would not exceed 0.5 acres each.

Power sources would include electricity, diesel fuel, gasoline, wind and/or compressed gas. Electricity would be used only when a well site would be located at an existing powerline.

Figure 1-6 contains illustrations of typical pipeline and well developments.



PIPELINE RIGHT-OF-WAY AFTER PIPE HAS BEEN LAID



TYPICAL WELL CONSTRUCTION

Figure 1-6
TYPICAL PIPELINE AND WELL DEVELOPMENT

Rainfall Catchments. There are seven catchments proposed. Catchments would consist of a collection area made from an impervious material designed to collect rainfall. The collected rainfall would be piped into a storage facility and then piped into a drinking facility for the animals. The size of the collection area and the storage facility would be determined by average annual rainfall and water requirements.

A fence would be constructed around the water collection area and the storage tank in order to exclude livestock and big game. Water would be piped out of the fenced area to the drinking facility. The trench for the pipeline would normally be dug by backhoe and then backfilled after the pipe was laid.

All vegetation scraped from the water collecting area and the storage area would be scattered around the construction site to lessen the visual intrusion and protect the soil surface from erosion. The fenced area would generally enclose 1 acre or less and total disturbance would be approximately 1 acre per catchment.

Water Storage Tanks. There are 20 storage tanks proposed. Storage facilities with an attached pipeline would be placed at predetermined areas. The size of these metal facilities would be determined by the number of animals requiring water from the source. Generally, the tanks would be above ground and water would drain from the bottom. The outside of the tanks would be painted to blend with the surrounding landscape so that visual impact would be lessened. Less than 0.2 acre would be disturbed by each tank.

Water Troughs. Approximately 70 drinking facilities (troughs) are proposed. The troughs would be round tanks or rectangular metal boxes of varying lengths. The size of each trough would be determined by the number of animals expected to drink from it at any one time. In general, wooden posts partially buried in the ground in a wooden frame around the trough would be used to steady the trough. Generally, about 100 square feet (0.002 acre) would be disturbed with each trough.

The following design provisions would be met on troughs constructed in the resource area:

1. Ramps would be provided in each water trough to allow small animals and birds to drink.

2. When possible, the lip of the water trough would not be higher than 2 feet above the ground, to allow young livestock and deer fawns to water.

3. Overflow discharge would be a piped from the water facility.

Figure 1-7 illustrates typical rainfall catchments, water storage tanks, and troughs. Figure 1-8 shows water tank with bird walk.

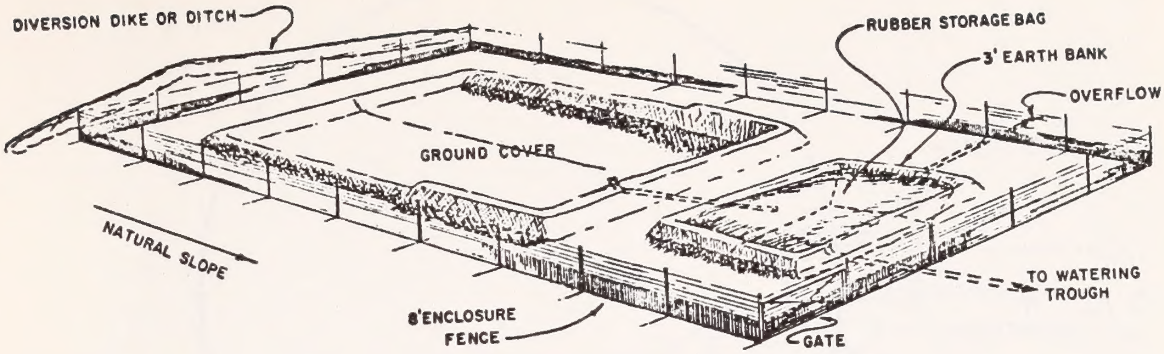
Reservoirs. Development of eight earthen reservoirs is proposed, each involving construction of a pit or dam to impound water throughout the year for livestock use. Fill material, if needed, would come from the impoundment area or a borrow area. A bentonite/clay mixture would be used when necessary to seal the reservoir to prevent seepage. An average of 3 acres would be disturbed by each reservoir. Topsoil removed during construction would be used to rehabilitate the banks and disturbed areas adjacent to the reservoir. A typical cross section of a reservoir dam is shown on figure 1-9.

Fences. An estimated 75.2 miles of fences would be required to keep livestock within desired areas. Construction would require survey of the line, placement of posts, stretching wire and placement of stays. Each of these operations would normally require off-road vehicular traffic along the fence. Figure 1-8 shows fenceline in place.

Gray steel posts may be used in constructing fences so that the posts would blend into the landscape. However, in event of a need to increase fencepost visibility, then red or green steel posts or wooden posts would be used. Where fences cross existing roads, either gates or cattleguards would be installed.

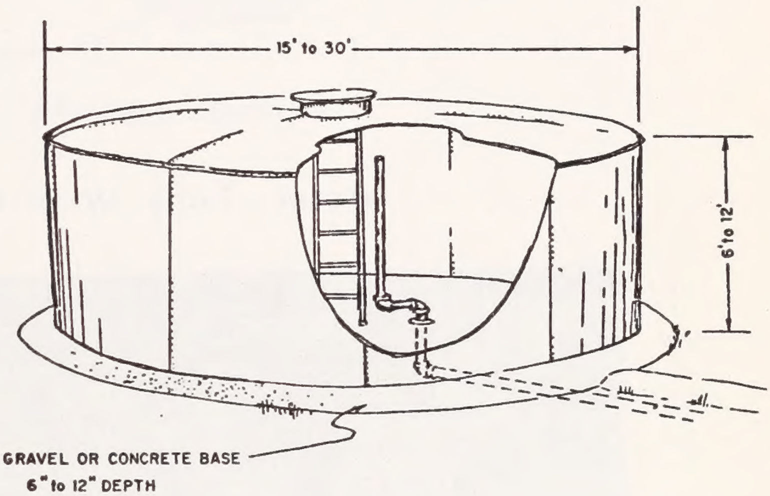
The following requirements would be met for fence construction:

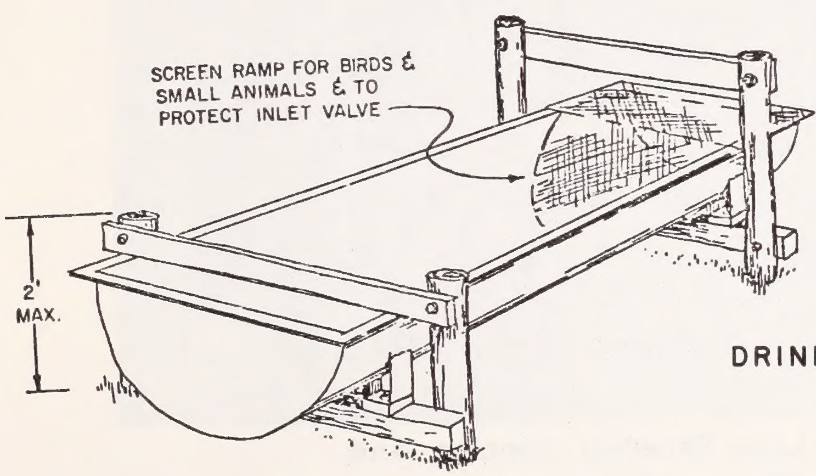
1. All new fences would have at least one gate every mile and gates at right-angle corners when conditions require.



RAINFALL CATCHMENT

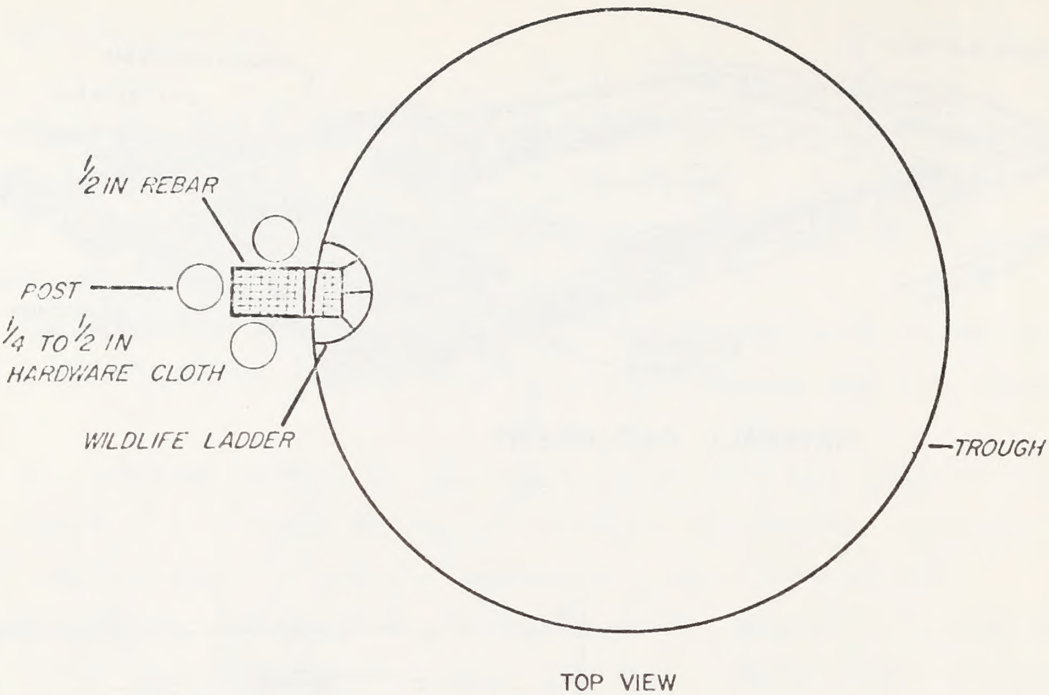
STORAGE TANK





DRINKING TROUGH

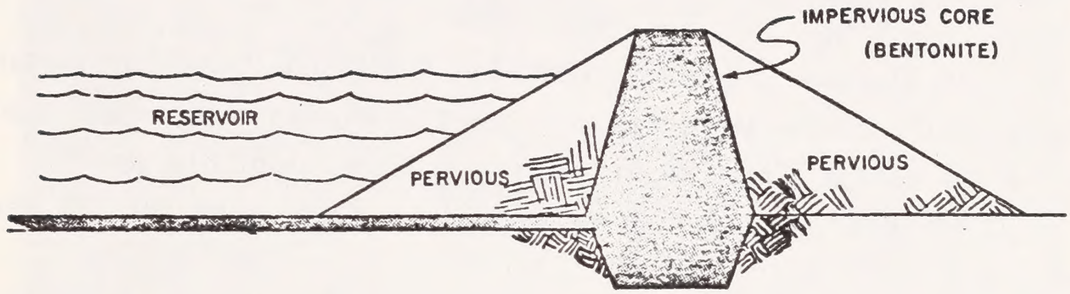
Figure 1-7
TYPICAL WATER-HOLDING DEVELOPMENTS



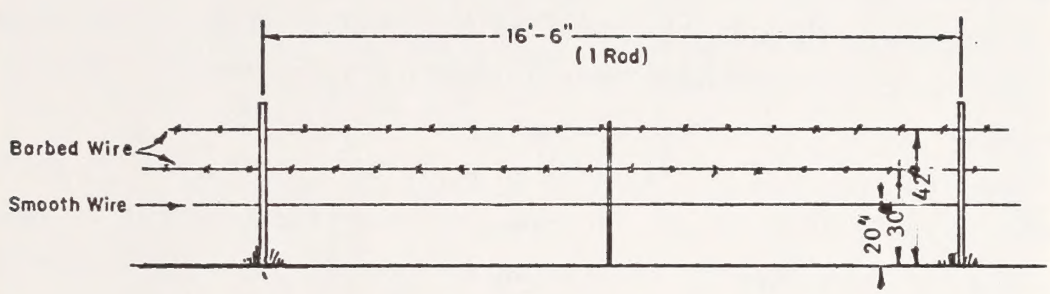
Water Tank With Bird Walk

Fence Line Showing Spacing And
Appearance After Construction

Figure 1-8
RANGE DEVELOPMENTS



Earthern Reservoir



DEER FENCE

Figure 1-9

TYPICAL RESERVOIR AND FENCE

2. All wire gates would have an opening device.

3. Right-of-way clearing would be limited to hand limbing and the removing of those trees in direct alignment with the fence. The fence would be attached to living trees by placing a board between the tree and the wire. About 1.2 acres per mile of fence would be disturbed during construction.

4. In big-game-use areas, division fences (pasture and boundary) would be constructed with barbed wire for the top two strands and smooth wire for the bottom strand to allow for the movement of big game.

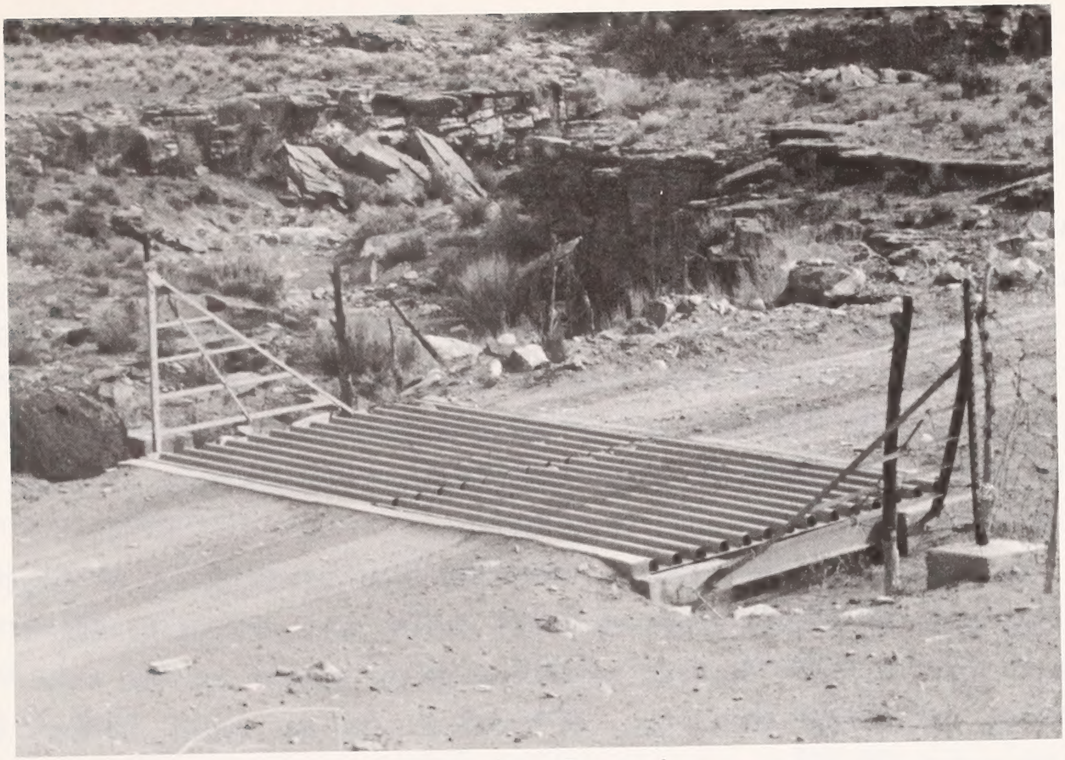
5. The spacing shown on figure 1-9 would be used for the fence wires.

Cattleguards. Nineteen cattleguards are proposed to control livestock movement at major travel routes and provide easy crossing to vehicular traffic. Approximately 0.01 acre would be disturbed during the construction of each cattleguard. A precast concrete or treated timber base would be set into the excavation, and earth would be backfilled and compacted around the base to prevent any movement. An immovable metal grid with openings large enough to keep animals from walking across but close enough to allow vehicles to drive over would be set onto the base. A gate would be placed to one side of the cattleguard so livestock could be moved through the fence. In addition, extremely heavy or wide loads could be taken through the gate rather than over the cattleguards.

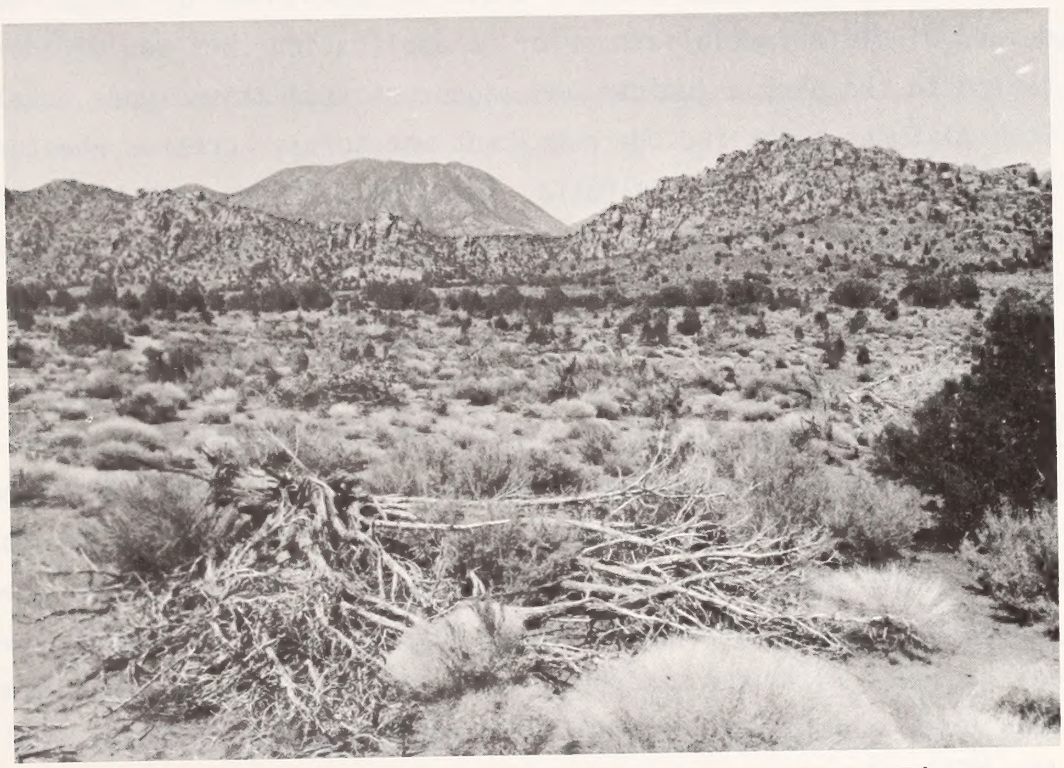
Figure 1-9 illustrates typical reservoirs and fences. Figure 1-10 shows a photograph of a cattleguard.

Trails. A trail 0.1-mile long would be constructed in order to develop a sufficient grade on one allotment (Gooseberry) to make it possible for livestock to utilize water that is presently inaccessible. The trail would be developed using hand and power tools along with explosives. Clearing of tree limbs and downed timber would be accomplished by use of hand and power saws.

Hand shovels, grubbing hoes, limited explosives, and axes would be used to develop the trail area. Where drainage would be necessary,



Cattle Guard



Chaining And Seeding With Brush Piles Left In Place

Figure 1-10
RANGE DEVELOPMENTS

check dips or water bars would be used to prevent accelerated erosion from developing on and around the trail.

Seeding (chaining). It is proposed to chain and seed 5,080 acres. Chaining would be accomplished by dragging an anchor chain attached to two tractors in a "U" or "J" configuration.

The general practice would be to chain in one direction, seed by aerial application, and then drag the chain at right angles to the first chaining to cover the seed and uproot any trees and shrubs missed by the first pass. The pattern would be irregular with islands of trees and travel paths left unchained for wildlife.

An onsite archaeological inventory and examination of physical factors such as slope, exposure, soil depth, and susceptibility of the site to erosion would be made to determine the actual chained area. The mixture, including seedlings, of seeded species would include both browse and grass species to enhance the forage quality for livestock and wildlife. The exact seed mixture would be determined by range, watershed, and wildlife specialists prior to application, but would generally be suited to the pinyon-juniper and sagebrush vegetative types involved. Typical mixtures might include pubescent wheatgrass, crested wheatgrass, yellow sweet clover, Ladak alfalfa, fourwing saltbush, and bitterbrush. After seeding, the area would be rested from livestock grazing at least 2 years or until the perennial forage is established. Figure 1-10 illustrates an area after a chaining and seeding action.

Summary of the range developments proposed is shown in table 1-9.

Maintenance. Various procedures would be followed to maintain the existing and proposed range improvements. Each year water developments would be periodically inspected to ensure that they remain in usable condition, and preventive maintenance would be performed as needed.

Implementation Schedule. The proposed AMPs would be implemented over a 5-year period. Although no schedule for construction can be determined at this time, a priority listing of allotment implementation is outlined in the MFP. A summary of the proposed action can be found in table 1-10.

TABLE 1-9

Summary of Proposed Developments

Improvement	Total		Cost
Springs	18	each	$ 29,970.00
Water pipelines and troughs	44.3	miles	135,292.00
Wells	2	each	5,730.00
Rainfall catchments	7	each	73,500.00
Water tanks	20	each	5,150.00
Reservoirs	8	each	24,000.00
Fences	75.2	miles	180,480.00
Cattleguards	19	each	22,800.00
Trails	0.1	mile	500.00
Seedings (chainings)	5,080	acres	76,200.00
TOTAL			$553,622.00

TABLE 1-10

Proposed Action Summary

Allotment	Public Land (acres)	Normal Operation (AUMs[a])	Livestock	System	Season of Use[b]	Fence (miles)	Cattleguards (units)	Reservoirs (units)	Springs (units)	Pipelines[c] (miles)	Tanks (units)	Wells (units)	Seedings (acres)	Catchments (units)	Combined Allotments	Actual Adjusted AUMs[d]	Season of Use[e]
	Proposed Management System					Proposed Range Developments									Proposed Change on Public Land		
INTENSIVE MANAGEMENT																	
Alger Hollow Alger Hollow Diamond Valley Wide Canyon Sand Wash	23,780	872	179C	3P	11 to 6	3.1	1	...	...	2.2	...	...	800	1	Yes	Down	Yes
Apex Slope Apex Slope	5,879	366	1,140S	2P	12 to 5	2.2	...	...	...	...	...	...	...	1	NC	NC	NC
Beaver Dam Slope Santa Clara/ Beaver Dam Slope Indian Springs Castle Cliffs	68,490	2,490	425C	3P	12 to 6	...	...	...	...	5.0	...	...	...	1	Yes	Down	NC
Big Mountain Big Mountain	9,126	325	62C	DR	5 to 10	2.0	...	...	2	...	...	...	...	...	NC	Down	NC
Boomer Hill Boomer Hill Cove Wash	4,327	138	46C	2P	12 to 3	1.6	...	...	...	...	...	...	...	...	Yes	Down	Yes
Boot Spring Boot Spring	2,118	60	15C	2P	11 to 3	0.4	...	...	1	0.6	1	...	...	...	NC	Down	Yes
Bull Mountain Bull Mountain	14,519	100	10C	3P	8 to 6	0.2	...	...	...	...	...	...	...	...	NC	Down	Yes
Central Central	2,920	368	64C	3P	11 to 5	2.0	3	...	...	...	...	...	...	...	NC	NC	NC

Note: The information in this table reflects the MFP allocations and specific data contained within the AMPs. Each proposed allotment is shown with its constituent existing allotments listed immediately below.

[a]AUM = Animal Unit Month; the amount of forage required to sustain the equivalent of one cow or five sheep for 1 month, the equivalent of 800 pounds of usable forage per acre.
[b]Months are not inclusive; 11 to 6 means November to June.
[c]Pipelines may contain tanks and/or troughs not reported.
[d]Change of less than 5 AUMs was considered "no change".
[e]Any change less than 2 weeks was not considered.

NA = Not applicable SL = Season long DR = Deferred rotation C = Custodial D = Deferred 1P = One pasture 2P = Two pasture
3P = Three Pasture C (under livestock) = Cattle S = Sheep H = Horses NC = No change

(continued)

TABLE 1-10 (continued)

	Proposed Management System					Proposed Range Developments									Proposed Change on Public Land		
Allotment	Public Land (acres)	Normal Operation (AUMs[a])	Livestock	System	Season of Use[b]	Fence (miles)	Cattleguards (units)	Reservoirs (units)	Springs (units)	Pipelines[c] (miles)	Tanks (units)	Wells (units)	Seedings (acres)	Catchments (units)	Combined Allotments	Actual Adjusted AUMs[d]	Actual Season of Use[e]
INTENSIVE MANAGEMENT (continued)																	
Coalpits &	1,390	82	86C	SL/C	10 to 6	1.5	...	1	...	...	...	...	...	...	Yes	Down	NC
Coalpits																	
Fault																	
Cougar Canyon	9,150	120	20C	DR	5 to 10	1.5	...	...	2	...	...	...	...	...	NC	NC	NC
Cougar Canyon			4H														
Curly Hollow	22,972[f]	1,056	224C	DR/SL	11 to 5	0.9	...	...	...	2.9	3	...	...	1	NC	Down	Yes
Curly Hollow																	
Dagget Flat	4,127	272	68C	3P	6 to 10	1.5	...	...	3	0.4	...	...	...	...	NC	Down	NC
Dagget Flat																	
Desert Inn	36,983[g]	1,335	232C	3P/D	11 to 5	0.5	...	1	...	2.0	1	...	...	1	NC	Down	Yes
Desert Inn																	
Dome	3,068	120	30C	3P	1 to 5	1.0	...	...	1	...	...	...	...	...	Yes	Down	Yes
Dome																	
Warner Valley																	
Fort Pierce	30,681	1,673	239C	3P	11 to 6	6.5	2	...	...	9.8	...	...	...	...	Yes	Down	NC
Fort Pierce, Utah																	
Fort Pierce, Arizona																	
Spendlove																	
Gooseberry	4,440	256	56C	3P	11 to 6	1.1	...	1	...	...	...	...	...	...	NC	NC	NC
Gooseberry																	
Grafton	7,258	128	29C	3P	12 to 6	2.5	...	...	1	...	...	...	...	...	NC	Down	NC
Grafton																	
Gunlock	6,334	240	39C	DR	10 to 6	1.7	1	...	...	...	...	...	...	...	NC	Down	NC
Gunlock																	

Note: The information in this table reflects the MFP allocations and specific data contained within the AMPs. Each proposed allotment is shown with its constituent existing allotments listed immediately below.

[a]AUM = Animal Unit Month; the amount of forage required to sustain the equivalent of one cow or five sheep for 1 month, the equivalent of 800 pounds of usable forage per acre.
[b]Months are not inclusive; 5 to 10 means May to October.
[c]Pipelines may contain tanks and/or troughs not reported.
[d]Change of less than 5 AUMs was considered "no change".
[e]Any change less than 2 weeks was not considered.
[f]Includes 1,410 acres holding pasture (SL).
[g]Includes Deferred pasture.

NA = Not applicable SL = Season long DR = Deferred rotation C = Custodial 1P = One pasture 2P = Two pasture 3P = Three Pasture
C (under livestock) = Cattle S = Sheep H = Horses NC = No change

(continued)

TABLE 1-10 (continued)

	Proposed Management System					Proposed Range Developments									Proposed Change on Public Land		
																Actual	
Allotment	Public Land (acres)	Normal Operation (AUMs[a])	Livestock	System	Season of Use[b]	Fence (miles)	Cattleguards (units)	Reservoirs (units)	Springs (units)	Pipelines[c] (miles)	Tanks (units)	Wells (units)	Seedings (acres)	Catchments (units)	Combined Allotments	Adjusted AUMs[d]	Season of Use[e]
INTENSIVE MANAGEMENT (continued)																	
Red Cliffs Red Cliffs Silver Reef Leeds	13,957	376	94C	3P	1 to 5	1.3	4	...	...	1.3	1	...	...	...	Yes	Down	Yes
Sand Mountain Sand Mountain Spring Sand Sand Mountain	21,085	1,477	211C	3P	10 to 5	7.0	3	...	...	11.0	...	...	...	...	Yes	Down	NC
Sandstone Mountain Sandstone Mountain	2,531	93	39C	1P	3 to 12	...	...	...	...	...	...	...	...	...	NC	Down	Yes
Santa Clara Creek Santa Clara Creek	3,038	69	23C	SL	12 to 3	...	...	...	...	...	...	...	...	...	NC	Down	Yes
Scarecrow Peak Catclaw Terry Beaver Dam Wash	40,622	1,680	240C	3P/C	11 to 6	5.0	...	...	...	3.5	...	2	...	1	Yes	Down	NC
Short Creek Canaan Gap Canyon Short Creek	5,180	555	166C	3P	12 to 6	2.8	...	...	1	1.5	3	...	...	...	Yes	Up	Yes
Smith Mesa Smith Mesa	1,940	36	45C	2P	3 to 3	...	...	...	...	...	...	...	...	...	NC	Down	Yes

Note: The information in this table reflects the MFP allocations and specific data contained within the AMPs. Each proposed allotment is shown with its constituent existing allotments listed immediately below.

[a]AUM = Animal Unit Month; the amount of forage required to sustain the equivalent of one cow or five sheep for 1 month, the equivalent of 800 pounds of usable forage per acre.
[b]Months are not inclusive; 3 to 12 means March to December.
[c]Pipelines may contain tanks and/or troughs not reported.
[d]Change of less than 5 AUMs was considered "no change".
[e]Any change less than 2 weeks was not considered.
[f]Includes 1,410 acres holding pasture (SL).
[g]Includes Deferred pasture.

NA = Not applicable SL = Season long DR = Deferred rotation C = Custodial D = Deferred 1P = One pasture 2P = Two pasture
3P = Three Pasture C (under livestock) = Cattle S = Sheep H = Horses NC = No change

(continued)

TABLE 1-10 (continued)

Allotment	Proposed Management System: Public Land (acres)	Normal Operation (AUMs[a])	Livestock	System	Season of Use[b]	Proposed Range Developments: Fence (miles)	Cattleguards (units)	Reservoirs (units)	Springs (units)	Pipelines[c] (miles)	Tanks (units)	Wells (units)	Seedings (acres)	Catchments (units)	Proposed Change on Public Land: Combined Allotments	Actual: Adjusted AUMs[d]	Season of Use[e]
INTENSIVE MANAGEMENT (continued)																	
Herd House	2,390	105	46C	SL/C	12 to 6	...	...	...	...	...	...	...	...	...	NC	Down	Yes
Herd House																	
Hurricane	1,910	84	25C	1P/C	10 to 6	2.0	...	...	...	...	...	...	...	...	NC	Down	NC
Hurricane																	
Hurricane Fault	19,426	1,218	174C	3P	10 to 5	3.5	...	...	...	2.1	...	...	...	1	Yes	Down	Yes
Eagle																	
Terrace																	
Frog Hollow																	
Workman Wash																	
Gould																	
Gould Ranch																	
Hurricane Mesa	3,290	30	14C	2P/C	12 to 11	...	...	...	...	...	...	...	...	...	NC	Down	Yes
Hurricane Mesa																	
Jackson Wash	28,680	1,450	223C	3P	11 to 6	6.7	...	1	1	...	...	...	2,000	1	NC	Down	NC
Jackson Wash																	
Land Hill	1,030	39	13C	SL	12 to 3	...	...	...	...	...	...	...	...	...	NC	Down	Yes
Land Hill																	
Little Creek	14,595	641	103C	3P	11 to 6	...	2	3	...	...	...	...	1,800	...	NC	NC	Yes
Little Creek																	
Mesa	1,640	24	18C	2P/C	12 to 10	...	...	...	...	...	...	...	...	...	NC	Down	Yes
Mesa																	
Minera Wash	4,637	206	70C	1P	11 to 6	3.1	...	...	1	...	...	...	...	...	NC	Down	Yes
Minera Wash																	

Note: The information in this table reflects the MFP allocations and specific data contained within the AMPs. Each proposed allotment is shown with its constituent existing allotments listed immediately below.

[a] AUM = Animal Unit Month; the amount of forage required to sustain the equivalent of one cow or five sheep for 1 month, the equivalent of 800 pounds of usable forage per acre.
[b] Months are not inclusive; 3 to 12 means March to December.
[c] Pipelines may contain tanks and/or troughs not reported.
[d] Change of less than 5 AUMs was considered "no change".
[e] Any change less than 2 weeks was not considered.
[f] Includes 1,410 acres holding pasture (SL).
[g] Includes Deferred pasture.

NA = Not applicable SL = Season long DR = Deferred rotation C = Custodial D = Deferred 1P = One pasture 2P = Two pasture
3P = Three Pasture C (under livestock) = Cattle S = Sheep H = Horses NC = No change

(continued)

TABLE 1-10 (continued)

Allotment	Public Land (acres)	Normal Operation (AUMs[a])	Livestock	System	Season of Use[b]	Fence (miles)	Cattleguards (units)	Reservoirs (units)	Springs (units)	Pipelines[c] (miles)	Tanks (units)	Wells (units)	Seedings (acres)	Catchments (units)	Combined Allotments	Actual Adjusted AUMs[d]	Season of Use[e]
	Proposed Management System					Proposed Range Developments									Proposed Change on Public Land		
INTENSIVE MANAGEMENT (concluded)																	
Toquerville Pintura Ash Creek LaVerkin Toquerville	11,075	188	41C	3P	1 to 5	0.5	...	...	...	...	8	...	...	...	Yes	Down	Yes
Trail Trail	3,220	147	45C 1,885S	2P	3 to 5	1.3	...	...	...	...	...	...	...	...	NC	Down	NC
Twin Peaks Twin Peaks	28,836	1,112	140C	3P/D	10 to 6	5.0	1	1	5	2.0	1	...	480	...	NC	Down	Yes
Veyo Veyo	8,056	339	52C	3P	11 to 6	0.3	1	...	...	...	...	...	...	...	Yes	Down	Yes
Virgin Virgin Mountain Dell	5,650	136	68C	3P/C	11 to 6	2.8	1	...	...	...	...	...	...	...	Yes	Down	Yes
Warner Ridge Warner Ridge	1,884	45	15C	1P	12 to 6	...	...	...	...	...	...	...	...	...	NC	Down	Yes
Washington Washington	9,765	153	46C	SL	12 to 3	1.7	...	...	...	...	...	...	...	...	NC	Down	Yes
White Dome White Dome	1,523	100	51C	SL/C	10 to 6	2.0	...	...	...	2.0	...	...	...	...	NC	Up	NC
SUB TOTAL	493,522	20,304				75.2	19	8	18	44.3	20	2	5,080	7			
Custodial in AMPs																	
Coalpits & Fault Fault	1,920	86	11C	C	12 to 4	...	...	...	...	...	...	...	...	...	NC	Down	NC

Note: The information in this table reflects the MFP allocations and specific data contained within the AMPs. Each proposed allotment is shown with its constituent existing allotments listed immediately below.

[a]AUM = Animal Unit Month; the amount of forage required to sustain the equivalent of one cow or five sheep for 1 month, the equivalent of 800 pounds of usable forage per acre.
[b]Months are not inclusive; 11 to 6 means November to June.
[c]Pipelines may contain tanks and/or troughs not reported.
[d]Change of less than 5 AUMs was considered "no change".
[e]Any change less than 2 weeks was not considered.
[f]Includes 1,410 acres holding pasture (SL).
[g]Includes Deferred pasture.

NA = Not applicable SL = Season long DR = Deferred rotation C = Custodial D = Deferred 1P = One pasture 2P = Two pasture
3P = Three Pasture C (under livestock) = Cattle S = Sheep H = Horses NC = No change

(continued)

TABLE 1-10 (continued)

Allotment	Proposed Management System: Public Land (acres)	Normal Operation (AUMs[a])	Livestock	System	Season of Use[b]	Proposed Range Developments: Fence (miles)	Cattleguards (units)	Reservoirs (units)	Springs (units)	Pipelines[c] (miles)	Tanks (units)	Wells (units)	Seedings (acres)	Catchments (units)	Proposed Change on Public Land: Combined Allotments	Actual Adjusted AUMs[d]	Season of Use[e]
Custodial in AMPs (concluded)																	
Herd House	480	33	11C	C	3 to 5	...	...	...	...	...	...	...	...	...	NC	NC	Yes
Hurricane	160	12	1C	C	SL	...	...	...	...	...	...	...	...	...	NC	Down	Yes
Hurricane Mesa	3,521	49	4C	C	SL	...	...	...	...	...	...	...	...	...	NC	Down	NC
Mesa	940	17	3C	C	5 to 10	...	...	...	...	...	...	...	...	...	NC	Down	NC
Scarecrow Peak Snow Holding Pasture	3,495	0	240C	C	5	...	...	...	...	...	...	...	...	...	NC	NC	NC
Virgin Mountain Dell	840	16	16C	C	10	...	...	...	...	...	...	...	...	...	NC	NC	NC
White Dome	984	8	1C	C	10 to 5	...	...	...	...	...	...	...	...	...	NC	Down	NC
SUB TOTAL	12,340	221				0	0	0	0	0	0	0	0	0			
CUSTODIAL																	
Airport Airport	147	7	1H	C	10 to 5	...	...	...	...	...	...	...	...	...	NC	Down	NC
Black Canyon Black Canyon	600	12	2C	C	3 to 6	...	...	...	...	...	...	...	...	...	NC	NC	NC
Box Canyon Box Canyon	659	48	19C	C	3 to 5	...	...	...	...	...	...	...	...	...	NC	Down	NC

Note: The information in this table reflects the MFP allocations and specific data contained within the AMPs. Each proposed allotment is shown with its constituent existing allotments listed immediately below.

[a]AUM = Animal Unit Month; the amount of forage required to sustain the equivalent of one cow or five sheep for 1 month, the equivalent of 800 pounds of usable forage per acre.
[b]Months are not inclusive; 10 to 5 means October to May.
[c]Pipelines may contain tanks and/or troughs not reported.
[d]Change of less than 5 AUMs was considered "no change".
[e]Any change less than 2 weeks was not considered.
[f]Includes 1,410 acres holding pasture (SL).
[g]Includes Deferred pasture.

NA = Not applicable SL = Season long DR = Deferred rotation C = Custodial D = Deferred 1P = One pasture 2P = Two pasture
3P = Three Pasture C (under livestock) = Cattle S = Sheep H = Horses NC = No change

(continued)

TABLE 1-10 (continued)

Allotment	Proposed Management System: Public Land (acres)	Normal Operation (AUMs[a])	Livestock	System	Season of Use[b]	Proposed Range Developments: Fence (miles)	Cattleguards (units)	Reservoirs (units)	Springs (units)	Pipelines[c] (miles)	Tanks (units)	Wells (units)	Seedings (acres)	Catchments (units)	Proposed Change on Public Land: Combined Allotments	Actual Adjusted AUMs[d]	Season of Use[e]
CUSTODIAL (concluded)																	
Cinder Mountain	2,240	27	6C	C	10 to 3	...	...	...	...	...	...	...	...	...	NC	Down	NC
Cinder Mountain																	
Dalton Wash	855	26	4C	C	11 to 5	...	...	...	...	...	...	...	...	...	NC	Down	Yes
Dalton Wash																	
Lamoreaux	160	11	2C	C	5 to 10	...	...	...	...	...	...	...	...	...	NC	Down	NC
Lamoreaux																	
Little Plain	930	16	4C	C	11 to 3	...	...	...	...	...	...	...	...	...	NC	Down	NC
Little Plain																	
North Grafton	500	12	3C	C	2 to 5	...	...	...	...	...	...	...	...	...	NC	Down	Yes
North Grafton																	
Red Butte	894	12	2C	C	5 to 11	...	...	...	...	...	...	...	...	...	NC	Down	Yes
Red Butte																	
Rock Springs	820	12	3C	C	6 to 12	...	...	...	...	...	...	...	...	...	NC	Down	NC
Rock Springs																	
Sand Hills	992	28	5C	C	12 to 5	...	...	...	...	...	...	...	...	...	NC	Down	NC
Sand Hills																	
Sand Wash Reservoir	640	13	2C	C	11 to 6	...	...	...	...	...	...	...	...	...	NC	Down	Yes
Sand Cove																	
Stout	235	2	1C	C	1 to 3	...	...	...	...	...	...	...	...	...	NC	Down	Yes
Stout																	
Yellow Knolls	525	16	2C	C	10 to 6	...	...	...	...	...	...	...	...	...	NC	Down	Yes
Yellow Knolls																	
SUB TOTAL	10,197	242				0	0	0	0	0	0	0	0	0			

Note: The information in this table reflects the MFP allocations and specific data contained within the AMPs. Each proposed allotment is shown with its existing allotments listed immediately below.

[a] AUM = Animal Unit Month; the amount of forage required to sustain the equivalent of one cow or five sheep for 1 month, the equivalent of 800 pounds of usable forage per acre.
[b] Months are not inclusive; 5 to 11 means May to November.
[c] Pipelines may contain tanks and/or troughs not reported.
[d] Change of less than 5 AUMs was considered "no change".
[e] Any change less than 2 weeks was not considered.
[f] Includes 1,410 acres holding pasture (SL).
[g] Includes Deferred pasture.

NA = Not applicable SL = Season long DR = Deferred rotation C = Custodial D = Deferred 1P = One pasture 2P = Two pasture
3P = Three Pasture C (under livestock) = Cattle S = Sheep H = Horses NC = No change

(continued)

TABLE 1-10 (concluded)

Allotment	Proposed Management System: Public Land (acres)	Normal Operation (AUMs[a])	Livestock	System	Season of Use[b]	Proposed Range Developments: Fence (miles)	Cattleguards (units)	Reservoirs (units)	Springs (units)	Pipelines[c] (miles)	Tanks (units)	Wells (units)	Seedings (acres)	Catchments (units)	Proposed Change on Public Land: Combined Allotments	Actual Adjusted AUMs[d]	Actual Season of Use[e]
ELIMINATION OF GRAZING																	
LaVerkin Creek	10,716	0	NA	NA	NA	...	...	...	...	...	...	...	...	...	NA	NA	NA
LaVerkin Creek																	
Pace Knoll	1,885	0	NA	NA	NA	...	...	...	...	...	...	...	...	...	NA	NA	NA
Pace Knoll																	
Pintura Seeding	904	0	NA	NA	NA	...	...	...	...	...	...	...	...	...	NA	NA	NA
Pintura Seeding																	
SUB TOTAL	13,505	0				0	0	0	0	0	0	0	0	0			
TOTAL	529,564	20,767				75.9	19	8	18	443	20	2	5,080	7			

Note: The information in this table reflects the MFP allocations and specific data contained within the AMPs. Each proposed allotment is shown with its existing alotmetns listed immediately below.

[a]AUM = Animal Unit Month; the amount of forage required to sustain the equivalent of one cow or five sheep for 1 months, the equivalent of 800 pounds of usable forage per acre.
[b]Months are not inclusive.
[c]Change of less than 5 AUMs was considered "no change".
[d]Any change less than 2 weeks was not considered.
[e]Includes 1,410 acres holding pasture (SL).
[f]Includes Deferred pasture.

NA = Not applicable   SL = Season long   DR = Deferred rotation   C = Custodial   D = Deferred   1P = One pasture   2P = Two pasture
3P = Three Pasture   C (under livestock) = Cattle   S = Sheep   H = Horses   NC = No change

GRAZING ADMINISTRATION AND IMPLEMENTATION PROCEDURES

Administration. Each operator would be issued term permits through the BLM Dixie Resource Area Office.

Livestock grazing use would be supervised throughout the year. Changes in use requested by the livestock operator, which are outside the limits of the normal operation specified in the AMPs and are consistent with management objectives, must be requested in writing and approved in advance of the grazing period. Grazing use outside the limits of the normal operation and without prior authorization would be considered trespass. If trespass should occur, action would be taken by BLM to assure that it is eliminated and that payment is made for forage consumed.

Upon evidence of trespass, the alleged violator would be served notice to remove the livestock and make payment based on the value of forage consumed; if trespass is committed by an existing permittee, revocation of license could follow in the event of failure to abide by notice to remove the livestock and pay damages (Code of Federal Regulations part 43, subpart 9239.3).

Typically, livestock would be trailed to allotments; however, in some areas, trucking would be necessary. Animal movement between pastures would be accomplished by trailing and by herding. At the conclusion of grazing, livestock would normally be trailed to National Forest lands, other ranges, or back to the ranch property. Allotments containing proposed seedings would not be grazed at a capacity that included the seedings until they are established and capable of supporting livestock grazing. A minimum of 2 years would be needed for seeding establishment.

Implementation. It is the goal to attain specific management objectives in a maximum period of 24 years after proposal implementation. It is anticipated that the proposal would be implemented in stages over a 5-year period as funds and manpower become available rather than all at once.

Related Actions. The following actions would be required in order to implement the proposed action:

Federal Actions. A management agreement between BLM and Dixie National Forest would be needed for forest land contained within proposed BLM allotment boundaries. These lands are isolated tracts that are fenced in with public land because exclusion is not practical due to rough terrain. Agreement would be made prior to implementation.

A rangeline fence agreement would have to be completed between BLM, Cedar City District and BLM, Las Vegas, Nevada District, in order to fence a portion of the border to prohibit livestock movement across the State line into Utah. The agreement would specify the area to be fenced, construction responsibility, maintenance, and cost. The agreement would have to be initiated prior to construction and implementation.

Coordination with U.S. Fish and Wildlife Service for clearance on proposed actions relating to threatened and endangered species would be required plus BLM evaluation of possible impacts prior to construction and implementation phases.

State Actions. Archaeological and Historical Society clearance would be needed from the State archaeologist for projects constructed in Arizona. The Utah State Historic Preservation Officer has accepted the BLM-proposed means to insure protection of cultural values which have archaeological, historical, architectural, and cultural importance and interest (Appendix III). Onsite investigations and clearance would be needed prior to construction. The Utah Division of Wildlife Resources would be contacted prior to development of range improvements that affect wildlife for their recommendations to insure wildlife needs are considered.

County Actions. Clearance would be required from the Washington County Commission for any fences that would cross county roads. The BLM would furnish the cattleguards which would be installed and maintained by the county.

MONITORING PROGRAMS

Evaluations and Studies. The proposed action includes an evaluation at the conclusion of grazing cycles by various study procedures that would monitor changes in plant composition and ground cover. Four primary studies are basic to this evaluation: actual grazing use, vegetative utilization, range condition and trend, and climate analyses (BLM Manual Section 4413.3). In addition, collection of data on wildlife habitat, riparian vegetation, utilization and trends, and watershed condition is proposed if pertinent to the resource values of the allotment. For example, supplemental studies would be conducted on riparian areas to determine if objectives for stabilization and/or improvement are being achieved. If the objectives on some of these areas are not being achieved, other alternatives, such as fencing to control livestock, would be considered.

Data from these studies would be evaluated to determine the effectiveness of current management and assist in making appropriate adjustments

Modification. If the evaluation procedures determine that the specific objectives established on the allotment are not being achieved, the AMP would be modified. Such modifications (revisions) could include changes in the grazing system, livestock numbers, season of use, additional range developments, or any combination of revisions in order to attain the objectives. Allotment Management Plan modifications would require preparation of an environmental assessment record or a supplement to this environmental statement before significant change could be effected. In addition, the BLM Area Manager would make adjustments in the grazing systems during periods of drought or other emergencies when such adjustments would be in the interest of accomplishing management objectives (Administrative Procedures for Grazing Use Adjustment - BLM Manual 4115 Utah Supplement Release 4-7).

INTERRELATIONSHIPS

This section describes how the proposed action interrelates with existing or proposed National, State, and local government plans and policies, and private projects. The administration of public lands involves a complex interdependence between lands of different ownership, users' capabilities, and needs.

This complex interdependency of lands has developed in the livestock industry not only in the Washington County area but throughout the western United States. Besides providing forage, growing demands for energy, food, fiber, water, minerals, recreation opportunities, and wildlife have given Federal lands an even greater value (CAST, 1974).

Because public lands in the west are extensively interspersed with private and State-owned land, the use and management of land under one ownership has a strong influence on the use of adjacent land owned by others (CAST, 1974). Close coordination between the various land managing agencies is required in order to accomplish common goals and avoid resource use conflicts.

Federal Programs

Utah BLM. The following discussion describes how the land allocations supporting the proposed action were derived. The planning documents prepared for the area covered by the Hot Desert ES provide an analysis of land use alternatives that lead up to the development of planning guidelines which indicate land to be wholly or partially dedicated to livestock grazing. The discussion identifies land uses foregone to permit the development of the proposed action and indicates the degree to which the proposal has been scaled back in favor of other land uses or because of limited resource capability.

Description of Planning System. The BLM adopted a multiple use planning system during the mid-1960s. This system, which has been continually studied and improved, is basically a tool that combines resource and socioeconomic data along with identified public needs into a specific course of action for the variety of natural resources administered by

BLM. As new information becomes available or conditions change, the system is revised accordingly.

The planning system process is based on the identification of specific geographic areas called planning units. It is at this identification level that the six basic planning system components, described below, are applied. Public involvement is very important in every phase of the planning system and is used in the development of each component.

Land and Resource Inventory. Inventories contain data on land and resource location, extent, utilization, condition, and trend. Basic inventories for the Virgin River Planning Unit were updated in 1976.

Unit Resource Analysis (URA). This document contains resource inventory summaries, analysis of resource potential, and evaluation of the capability of the land to fill the various public resource activity needs. The URA for the Virgin River Planning Unit was updated in 1976.

Social Economic Profile. This component identifies and analyzes socioeconomic conditions on a large scale. The profile for the entire Cedar City BLM District was completed in 1977.

Planning Area Analysis. The Planning Area Analysis relates existing and future needs of the public to the natural resources available within specific planning units. (This analysis was not used for the Virgin River Planning Unit because it is a relatively new concept and has not yet been completed for this unit).

Management Framework Plan (MFP). This land use plan is developed using resource management opportunities identified in the URA, plus applicable socioeconomic information. Objectives and recommendations are developed for each resource activity, consistent with socioeconomic, policy, and environmental needs. A multiple use analysis process then establishes the best "mix" of land use allocations. The MFP for the Virgin River Planning Unit was originally completed in 1973 and was revised in 1977. This MFP covers the entire Hot Desert ES area with the exception of the Arizona portion (15,391 acres of public land) which is scheduled for MFP completion in 1979. Because this Arizona area has similar features, resource opportunities, and demands, it is anticipated

that MFP grazing allocations would be similar to those in the Virgin River MFP. The MFP recommendations served as both guides and constraints to BLM personnel involved in preparing the proposed action for this ES. The MFP allocated various resource uses for specific geographic areas and established levels of use .

Activity Plans. These plans detail how multiple use guidelines will be implemented. For example, the allotment management plans (AMPs), from which part of the proposed action is derived, are activity plans. Early in 1977, AMPs were completed for the Virgin River Planning Unit.

Figure 1-11 illustrates how this process fits together. In addition, a detailed description of the entire planning process can be found in BLM Manuals 1601 to 1609.

The following is a brief description, by resource, of multiple use considerations contained in the Virgin River MFP that affect the proposed action. These guidelines include both constraints on grazing and resource uses foregone as a result of the grazing of domestic livestock; a brief rationale is also provided. Table 1-11 contains a summary of the MFP. The complete Virgin River MFP and associated documents are available for public inspection at the BLM St. George Area Office and Cedar City District Office.

Recommended Decisions For Livestock Management Activities

1. Designate rangeland as either suitable or unsuitable and adjust livestock grazing use accordingly. No allotment will be grazed over the carrying capacity. In determining suitability for livestock grazing, consider such factors as vegetative productivity, distances from water, erosion levels and steepness of slopes. (For a detailed description on how suitability is determined, see Appendix IV.)

2. Establish and maintain the livestock forage production attainable on 529,564 acres of public land in the Virgin River Planning Unit while providing 27,926 AUMs of livestock forage in the future on a sustained yield basis. In the interim until such potential is realized provide 20,767 AUMs of currently available livestock forage. Over the long term, economic stability for the livestock operators and improvement of resource conditions are the goals.

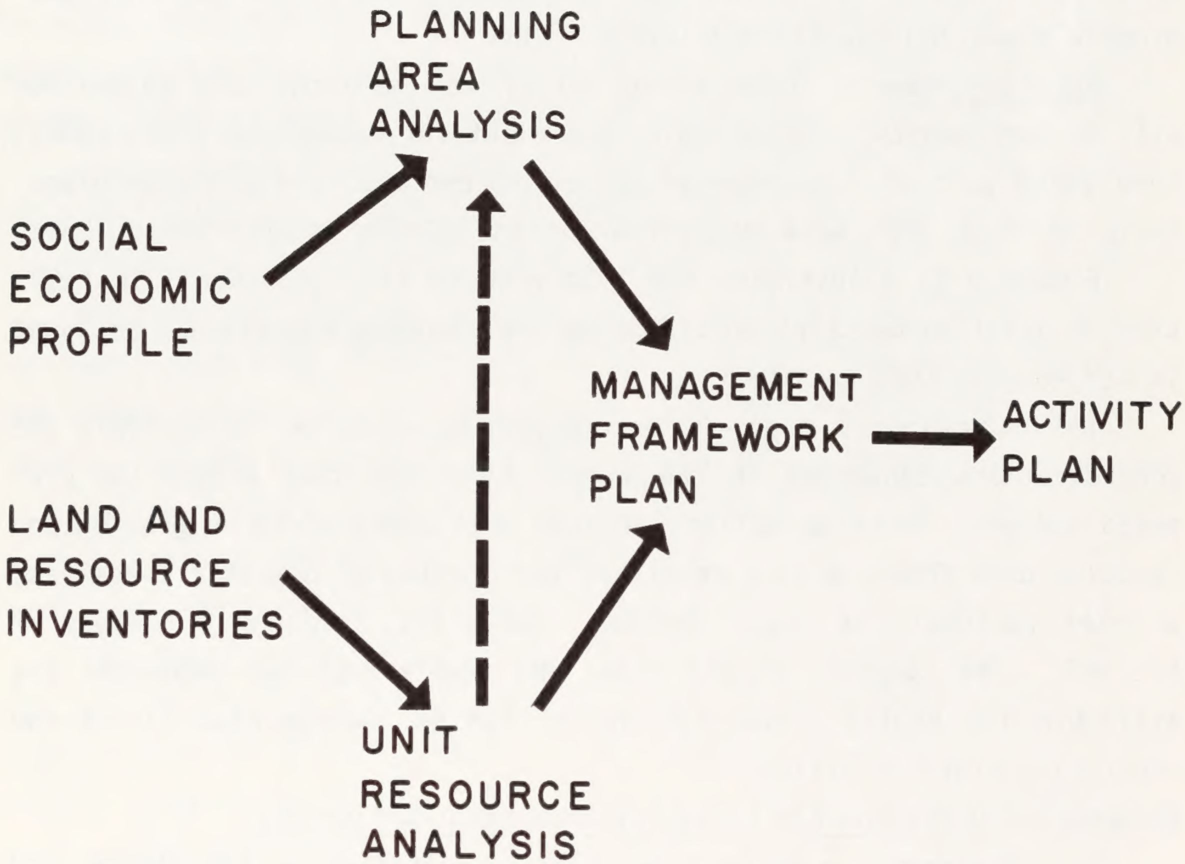


Figure 1-11
BLM PLANNING PROCESS

TABLE 1-11

Summary of Present or Potential Land Uses That Interact With Livestock Grazing

Activity	Resource Potential Recommendation	Multiple Use Consideration	Recommended MFP Decision	Management Goals and Objectives	Restraints on Grazing	Resource Use Foregone For Grazing
1. Recreation	A. Designate Red Mountain and LaVerkin Creek areas as recreation land; remove grazing from LaVerkin Creek Allotment	Complement riparian habitat protection; enhance bighorn sheep potential transplant habitat; resulting land acquisition would complement wildlife and protect T&E plants; no significant conflicts with grazing.	Approve with boundary modification; impractical to fence out cattle in some areas; restrict range activities in these areas.	Manage area for scenic, natural and primitive qualities. Restrict range management in those areas left open.	Open part of Veyo, Sand Wash, and Gunlock Allotments to grazing, but prohibit developments that would encourage livestock concentration; close Red Mountain plateau to grazing; designate LaVerkin Creek Allotment as recreation land; limit use to trailing by permit and withdraw from grazing.	Excludes Toquerville Allotment from designation to eliminate fencing; AMP development will protect area.
Recreation	B. Designate Warner Valley and Sand Mountain areas as "open" to ORV use; develop access and water at Sand Mountain	Could impact proposed T&E species; conflict with grazing by possible damage to plants and soil and interference with management.	Approve but exclude Warner Valley; limit use to roads because of fragile watersheds.	Manage area to satisfy ORV demand	ORV use on Sand Mountain will affect vegetation and restrict livestock use and movement; most of ORV area confined to areas with limited forage production.	Some recreation use lost but AMP on Sand Mountain will provide cattleguards to facilitate ORV activities.
2. Wildlife	A. Retain water supply at original source whenever spring is developed; pond excess water at terminus of pipelines.	Would complement recreation; sightseeing may conflict with grazing if water is limiting; existing springs are critical habitat for many species; ponds provide oasis-type habitat.	Approve to establish a source of water for wildlife; also will provide small riparian areas for wildlife; would require archaeological clearance and pond bank revegetation to fit VRM rating.	Enhance wildlife habitat by providing water; AMPs will provide source by ponding and partially fencing excess water at terminus of pipelines and spring source.	Would restrict grazing if water were limiting and could not be split.	None
Wildlife	B. Protect riparian and aquatic habitat.	If fencing required to protect habitat, may cause visual impact; improved habitat condition would enhance water quality, recreation, and visual qualities; fencing would restrict livestock use.	Approve to protect habitat and retain in public ownership; restrict cultural development; modify AMPs as needed.	Manage for improved riparian habitat; restrict other activities as necessary.	Place salt no closer than 1 mile to water source and riparian areas; consider fencing if AMP does not improve in one complete cycle; will increase cost of management and slightly reduce forage.	Maximum resource protection foregone if all areas not fenced.

NOTE: This table and figure 1-3 are complementary, i.e., the activities and recommendations indicated in figure 1-3 correspond to the activities and recommendations contained in this table.

T&E = Threatened and Endangered

(continued)

TABLE 1-11 (continued)

Activity	Resource Potential Recommendation	Multiple Use Consideration	Recommended MFP Decision	Management Goals and Objectives	Restraints on Grazing	Resource Use Foregone For Grazing
Wildlife (continued)	C. Manage area to enhance mule deer habitat by improving forb composition through grazing and prescribed burning.	Good fawn production requires adequate succulents on summer ranges where presently lacking; burning would conflict with watershed; may restrict livestock grazing use periods; enhance recreation.	Approve to enhance deer habitat by forb management.	Design grazing systems to enhance forbs where possible; burning only where authorized according to fire plan and environmental assessment.	Possible restriction of grazing use periods to avoid periods of forb growth. Burning may restrict grazing system schedule and forage allocation.	Maximum enhancement of forbs foregone.
Wildlife	D. Manage for deer winter range and possible expansion of desert bighorn sheep; eliminate all livestock use and vehicles in selected areas.	Complements recreation, watershed; and vegetation; reduce deer loss by migration; enhance riparian habitat. Limit livestock grazing.	Approve with modifications; manage most of area for deer and possible bighorn sheep expansion; manage portion for livestock until more information becomes available	Design LaVerkin Creek Allotment to accommodate livestock trailing use only; maintain deer and bighorn sheep habitat.	LaVerkin Creek Allotment closed to grazing but cattle allowed to trail through; restrict livestock management in areas near border (avoid encouraging concentration).	1,260 acres will continue to be grazed by livestock on Hurricane Mesa, Toquerville, and Rock Spring Allotments until a wildlife forage survey for bighorn sheep becomes available. Grazing of cattle would not preclude bighorn use in these areas.
Wildlife	E. Allocate sufficient forage for wildlife use to support potential deer numbers and other wildlife.	Complements recreation, hunting. Limits livestock grazing.	Approve; allocate forage to meet projected potential.	Manage to provide sufficient wildlife forage for potential needs. The present available supply of 17,801 wildlife AUMs is sufficient to meet potential deer numbers and other wildlife needs. Allocate available forage on unsuitable livestock grazing areas to wildlife; allocate forage to wildlife as needed on suitable livestock grazing areas.	Restricts level of livestock use on suitable livestock areas in critical deer range.	None
Wildlife	F. Close area 2-F shown on figure 1-12, to livestock grazing to enhance wildlife habitat.	Complements recreation and riparian habitat and watershed loss of livestock grazing.	Approve; allocate available forage to wildlife.	Manage for wildlife in these areas.	Eliminate grazing on LaVerkin Creek, and Pintura Seeding Allotment (west of I-15); continue closure on Pace Knoll Allotment.	None

NOTE: This table and figure 1-3 are complementary, i.e., the activities and recommendations indicated in figure 1-3 correspond to the activities and recommendations contained in this table.

T&E = Threatened and Endangered

(continued)

TABLE 1-11 (continued)

Activity	Resource Potential Recommendation	Multiple Use Consideration	Recommended MFP Decision	Management Goals and Objectives	Restraints on Grazing	Resource Use Foregone For Grazing
Wildlife (continued)	G. Protect potential bighorn sheep habitat by not encouraging livestock concentration.	Generally complements recreation; little conflict with grazing since most areas are unsuitable for livestock; natural barrier excludes livestock in most areas; high aesthetic value.	Approve with modification of boundaries to coincide with Beaver Dam Slope Allotment; unsuitable area and boundary of recreation area on Red Mountain.	Manage for big horn sheep habitat in these areas; restrict other resources as necessary; design AMP to minimize conflict.	Restrict range management activities that would concentrate livestock in areas near the boundary (salting and water development); small loss of forage.	None
Wildlife	H. Develop a fire management plan to use fire where and when conditions permit for improvement of wildlife habitat.	Short-term loss of forage; improve habitat for deer, doves, quail, rabbit; possible conflict with watershed in erosive areas; visual impact possible. Long-term increase in livestock and wildlife forage.	Approve with necessary fire plan and environmental assessment; take necessary mitigating measures to stabilize after fire.	Manage unit for other resources, but encourage wildlife habitat where possible.	Possibly affect grazing in short term; if burning allowed would restrict schedule of grazing systems.	None
	I. Improve native fish habitat on North Creek by eliminating stream bank destruction and construct necessary improvement facilities such as fence, trash collections, etc.	Contribute to greater stability of watershed; improve water quality; increase fish potential; possible visual impact if fenced reduction in grazing use; complement recreation.	Reject because of small area involved; only 1.5 miles of entire stream length under BLM control.	Manage the area for other resources; improve fish habitat by proper design of grazing systems.	Avoid livestock concentrating in these areas through implementation of grazing system and management practices aimed at avoiding these areas.	Maximum fisheries habitat; protection of 1.5 miles of North Creek; riparian habitat protection provided by Wildlife 2-B recommendation.
Wildlife	J. Expand the existing Joshua Tree Natural Area as "Woodbury Desert Study Area;" manage for desert tortoise and other wildlife and plant species of the desert ecosystem.	Unique ecological community - transition between hot and cold desert biomes. Unique plant and animal combinations; rare plants and desert tortoise population; would restrict mineral location and oil and gas exploration; complement recreation and visual resources; preclude potential sales of desert vegetation products; scientific and academic value.	Approve in part; manage critical areas east of highway as Desert Study Area because many factors causing decline of tortoise still unknown; manage area west of highway for multiple use.	Manage east of highway for Desert Study Area; manage for multiple use on west side of highway but restrict surface-disturbing activities while desert tortoise are active and in areas near dens; exclude livestock use and restrict other activities (ORV) after March 15.	Eliminate grazing on a portion of the east side of highway in the Beaver Dam Slope Allotment; would reduce forage by 60 AUMs and 2,840 acres of public lands.	Not known until continued monitoring of tortoise habitat identifies use foregone.

NOTE: This table and figure 1-3 are complementary, i.e., the activities and recommendations indicated in figure 1-3 correspond to the activities and recommendations contained in this table.

(continued)

T&E = Threatened and Endangered

TABLE 1-11 (continued)

Activity	Resource Potential Recommendation	Multiple Use Consideration	Recommended MFP Decision	Management Goals and Objectives	Restraints on Grazing	Resource Use Foregone For Grazing
Wildlife (continued)	K. Adjust livestock grazing season in the Beaver Dam Slope Allotment to protect desert tortoise habitat.	Generally enhance resources; provide spring forage for tortoise and eliminate competition; restrict livestock grazing activities.	Approved; terminate grazing in the spring by March 15 until AMP is implemented.	Manage area west of highway for livestock grazing and encourage protection of desert tortoise until new information becomes available.	Under AMP, grazing after March 15 will be allowed every third year after a 2-year rest period.	Maximum protection for the desert tortoise in this area foregone; however, from information available, restriction of spring use will reduce present competition for forage and improve existing level of livestock use.
3. Vegetation - T&E	A. Gather background data for conservation and protection of proposed T&E species.	Fish and Wildlife Service identification of critical habitat is required by law; clearance is required before activities which would disturb such habitat may be approved; may affect all resource activities.	Approve; accomplish inventory as soon as possible; surface disturbing projects will have an investigation to determine the possible presence of T&E species before construction.	Manage to conserve proposed T&E species as they may be designated and as information becomes available to determine necessary protection measures.	May restrict construction of range developments.	None
4. Forestry	A. No significant interaction with forestry and grazing					
5. Watershed	A. Protect soils by restricting use to activities which will not destroy or reduce the present vegetative cover or disturb the soil surface.	ORV restriction; restriction on grazing generally benefit aesthetics, water quality, and riparian habitat.	Approve	Manage other resources as needed to protect watershed conditions; incorporate watershed protection into AMPs.	Follow management practices that draw livestock from critical watershed areas such as salting or hauling water; do not base carrying capacity for livestock on these areas.	None
Watershed	B. Protect frail watersheds by excluding activities that disturb the surface; exclude grazing and ORV use.	Complements riparian habitat and water quality; conflicts with recreation and grazing although grazing limited on rough areas.	Modify; leave area open to activities except ORV use; restrict other uses; continue to monitor watershed conditions.	Manage for critical watershed; develop AMPs that will protect soils.	Close LaVerkin Creek Allotment to grazing except trailing; manage to draw livestock from critical watersheds; do not base carrying capacity on critical areas; improve distribution of livestock.	May not provide maximum protection to frail watersheds.

NOTE: This table and figure 1-3 are complementary, i.e., the activities and recommendations indicated in figure 1-3 correspond to the activities and recommendations contained in this table.

T&E = Threatened and Endangered

(continued)

TABLE 1-11 (concluded)

Activity	Resource Potential Recommendation	Multiple Use Consideration	Recommended MFP Decision	Management Goals and Objectives	Restraints on Grazing	Resource Use Foregone For Grazing
Watershed (continued)	C. Restrict livestock grazing and ORV use in order to reduce wind erosion problems.	Complements all resources indirectly but restricts recreation-ORV use and may restrict mining; restricts grazing but most of the sand dune areas are unsuitable for livestock.	Approve as modified; allow controlled ORV use; allow mining with stipulations; manage livestock under AMP.	Manage other resources to encourage protection from wind erosion; direct ORV use to dune area.	Sand Mountain in allotment managed under AMP that incorporates erosion protection needs; no forage allocation made for dune areas.	May not provide maximum protection from wind erosion.
6. Minerals	A. No significant interaction with mineral activity and grazing.					
7. Lands	A. Consider area between Bloomington and Sand Mountain for domestic water pipeline route.	May interfere with protection of the T&E species; possible conflict with visual resources; possibly affect stock wells by lowering water tables.	Approve subject to environmental assessment prior to construction.	Manage for multiple use with consideration for pipeline route to meet domestic needs.	May require reducing carrying capacity, if pipeline constructed.	None
Lands	B. Reserve land for proposed Warner Valley powerplant and its facilities.	Possible conflict with minerals and visual resources; restrict grazing use in the area by reducing suitable acres for grazing; interaction with protection of T&E species.	Defer decision pending completion of Warner Valley ES and BLM decision in the interim; do not permit projects or developments to be constructed that would conflict with the Warner Valley project.	Provide land needed for Warner Valley project; modified management of other resources; design AMPs with an alternative in the event the proposal proceeds.	Dome and Fort Pierce Allotments affected; 284 AUMs of livestock forage eliminated; may restrict movement of livestock and require adjustments in level of use.	None
Lands	C. Classify lands for disposal near expanding communities to meet increased demand.	Would possibly affect retention and protection of riparian habitat, minerals activities, protection of T&E species and archaeological resources and would restrict livestock grazing.	Modify, adjust boundary to retain riparian habitat along Santa Clara River; actual disposition on a case-by-case basis and with demonstrated need.	Manage for disposal pending completion of necessary studies directed at determining resource significance; valuable in satisfying State selection rights and land exchanges for other land needed in BLM programs.	If areas are disposed, will restrict livestock use by approximately 770 AUMs on the allotments shown in Appendix XXVI.	None

NOTE: This table and figure 1-3 are complementary, i.e., the activities and recommendations indicated in figure 1-3 correspond to the activities and recommendations contained in this table.

T&E = Threatened and Endangered

3. Authorize custodial management where field investigations and livestock forage condition studies indicate that allotments are not suitable or are only partially suitable for intensive livestock management, but where the allotments have some value for livestock grazing. Forage values will not be developed to their full potential since no intensive grazing management plan is designed in these areas; grazing will be authorized for the capacity of Federal range with appropriate stipulations for custodial management.

4. Initiate intensive livestock management through implementation of AMPs and associated range developments and combine allotments in order to implement grazing systems and necessary range developments. Trend studies show that the apparent trend is down or static for most of the 529,564-acre Virgin River MFP area. Studies conducted show 232,188 acres of livestock forage in poor condition (this is not necessarily indicative of range condition but only indicates the condition of those forage species preferred by domestic livestock), 140,653 acres - fair, 26,150 acres - good, and 130,573 acres unsuitable for livestock. This apparent downward trend and other range problems, such as overutilization of desirable forage species and improper livestock distribution, can be improved through implementation of AMPs with grazing systems that will provide for plant and soil needs not currently being supplied by existing management procedures. AMPs will determine season of use, prescribe a grazing system, and include necessary range development projects to implement the grazing system.

5. Make an interim livestock grazing management decision to manage specific allotments or portions thereof for the period between the present time and such time as the proposed AMPs can be implemented (table 1-12). Close the Canyon and Terrace allotments to grazing until the plant vigor on the key forage species is in fair to good condition. Provide rest for the key forage species on the remaining allotments by a combination of one or more of the following management practices:

a. Haul water

b. Rotate cattle on existing waters

c. Place salt at least 1 mile away from water

d. Herd livestock to seldom-used areas

e. Adjust season of use to eliminate grazing during the growing season

These management practices will be implemented to assist in establishing an upward trend in the key forage species prior to implementation of the AMP.

6. Management and administration of trailing permits would reduce competition for forage. Stock must be trailed through and not allowed to drift free; trailing must take place on designated trails and road rights-of-way. One-night stops should be in corrals, where available.

Present or Potential Land Uses that Interact with Livestock Grazing. A summary of those resource uses in the Virgin River MFP that interact with grazing is incorporated in table 1-11 and shown in figure 1-12 bound in at the back of this volume. For a complete review of the resource recommendations, multiple use analysis, and rationale, consult the Virgin River MFP.

TABLE 1-12

Allotments Designated for Interim Management

Alger Hollow (east portion)	Ash Creek
Beaver Dam Wash (Dodge Spring Wash only)	Big Mountain (north portion only)
Canyon	Dome
Frog Hollow	Grafton
Gunlock (along Santa Clara Creek)	Jackson Wash (along Jackson Wash only)
LaVerkin	Pintura
Terrace	Twin Peaks (seeding only)
Warner Valley	Workman Wash

Arizona BLM. The BLM Arizona Strip District and the Cedar City District have signed an interdistrict agreement on range management. The agreement includes the boundary line from the Nevada border to the easternmost edge of the Arizona Strip. The resultant effect on the area covered by this environmental statement was an exchange of jurisdiction of five existing Utah allotments (to Arizona management) and two Arizona allotments (to Utah management).

District management of grazing on these seven allotments would require coordination since grazing management interrelates with multiple use planning, policies, and other programs.

Bureau of Reclamation. Under the Colorado River Basin Salinity Control Act of 1974, the Bureau of Reclamation (BuRec) has proposed construction of a desalinization plant near LaVerkin Springs in Washington County and has filed a draft environmental statement. In order to locate the proposed desalinization plant, BuRec has requested the withdrawal of certain lands contained in the proposed Sandstone Mountain and Sand Hills Allotments. If these lands should be withdrawn for BuRec's purposes, then 545 acres out of a total of 3,523 contained within the two allotments, along with 17 AUMs out of a total of 121, would no longer be available for livestock grazing. While overall management objectives for this ES would not be affected, such a withdrawal would present a conflict with proposed BLM management decisions and levels of grazing use for these two allotments.

Forest Service. In general, the Forest Service has the same multiple use land management policies as BLM: long-term sustained use of the resource for the benefit of the public is a management objective shared by both agencies. For this reason management programs of the two agencies are similar and, to a degree, complementary.

Twenty-seven BLM permittees having cattle operations on 17 proposed allotments also graze on the adjacent Dixie National Forest. Generally, these permittees use the Forest Service ranges from June 1 through the end of September or mid-October. The permittees utilize BLM and privately controlled ranges for the rest of the year. The range program on

the Dixie National Forest is established in that the allotments have been adjudicated and grazing management plans are implemented. Although the Forest Service and BLM maintain separate range management programs, close coordination between the permittee and both agencies is practiced. Table 1-13 indicates those BLM and Forest Service allotments jointly used in connection with livestock operations in Washington County.

Soil Conservation Service. The Soil Conservation Service (SCS) efforts are primarily directed toward stabilization of the soil and watershed resources and increasing the productive capability of private land. Basic policies regarding resource conservation are similar between SCS and BLM and many projects, such as the Warner Draw Watershed Work Plan, are complementary to BLM management objectives to improve watershed through livestock management. In this cooperative improvement program, BLM has agreed to pursue a land treatment program that is designed to stabilize the soil. Much of the work, including construction of erosion check dams and reservoirs, has been completed. These joint conservation efforts require continuing coordination between BLM and SCS in order to achieve maximum conservation.

In an effort to improve production capability on private land, SCS has developed its farm and ranch plan programs which include soil conservation projects such as detention reservoirs and seedings. In the case of ranch plan development, grazing systems are designed to effectively use the private range. In an integrated program, other rangelands such as public land must be considered. If the private ranch plan development incorporates other use on public land, conflicts could arise, particularly if use on public land is adjusted. The management programs of these two agencies should be closely coordinated to avoid conflicts and still accomplish management goals.

State of Utah Programs. The Office of the Utah State Water Engineer controls the allocation of water resources for all State and private land within the State. Because the proposed action involves water developments, close cooperation must be maintained between BLM and the Water Engineer Office to assure that sufficient water would be available. This grazing proposal also involves piping water across the Utah

TABLE 1-13

Number and Distribution of Permittee Usage by Allotment on FS-BLM Ranges in Washington County, Utah

BLM, Dixie Resource Area Proposed Allotment	Season	FS, Dixie National Forest (Allotment and Season) Bull Valley 6/1-9/30	East Pinto 6/1-10/15	Gray's Ranch Pasture 5/16-11/15	Gunlock 6/1-9/30	Magotsu 6/1-10/15	Pine Valley 6/1-10/15	Small Pasture 6/1-9/30	West Pinto 6/1-10/15	Total[a] Permittees in Allotment
Alger Hollow	11/16-5/31	...	...	...	...	...	2	...	...	2
Beaver Dam Slope	12/1-5/31	9	...	...	...	1	...	...	...	9
Boomer Hill	12/1-2/28	2	...	...	...	...	...	...	...	2
Central	11/1-4/30	...	...	1	...	2	...	...	...	2
Curly Hollow	11/16-5/22	1	1	...	...	...	...	...	...	2
Dagget Flat	6/1-9/30	5	...	...	...	...	...	...	...	5
Dome	1/1-4/30	...	1	...	...	...	1	...	...	1
Gunlock	[b]10/16-5/31 [c]10/1-2/28	...	...	...	2	...	1	...	...	2
Jackson Wash	11/16-5/31	...	...	1	...	3	...	...	3	4
Land Hill	12/1-2/28	...	...	...	...	1	...	...	...	1
Minera Wash	11/1-1/31 or 3/1-5/31	...	...	...	3	...	1	...	...	3
Sand Mountain	10/16-5/16	...	...	...	...	...	...	...	1	1
Sand Wash Reservoir	11/15-5/31	...	...	...	1	...	...	...	...	1
Santa Clara Creek	12/1-2/28	...	...	...	...	1	...	...	...	1
Scarecrow Peak	11/1-5/31	...	1	...	3	...	4	1	...	6
Twin Peaks	10/1-5/31	...	...	...	1	...	...	...	...	1
Veyo	11/16-5/31	...	...	...	1	...	1	...	...	2
Total Permittees[a] in Allotment		9	2	1	6	7	5	1	3	

[a]Total permittees within this table will not add to the total shown by allotment because many permittees have use in more than one allotment administered by either BLM or FS.

[b]Use as prescribed in AMP year 1, 2, 4, and 5.

[c]Use as prescribed in AMP year 1 and 3.

border into Arizona, which would require coordination with the Arizona Water Engineer Office.

The Utah Division of Wildlife Resources (DWR) is responsible for the protection, management, and conservation of wildlife in Washington County. The BLM manages habitat on public land for wildlife.

The BLM planning system incorporates wildlife needs and their habitat requirements into multiple use considerations. The proposed action was developed through coordination with DWR. Wildlife forage allocations have been included in the proposal and range developments have been designed to enhance wildlife uses. According to DWR estimates, the public land wildlife forage allocated in the proposal for the Hot Desert area would be sufficient to meet the projected demands by deer.

Since management activities of both agencies are closely related, continued coordination would be necessary particularly in the areas of wildlife harvests, population studies, habitat management, and protection of threatened or endangered wildlife species.

The Utah State Division of Lands leases most eligible State-owned rangeland for grazing purposes. If these lands are located within or adjacent to BLM allotments and the permittee holds a current State lease, he may enter into an Exchange of Use Agreement with BLM for lands under State lease. In exchange, the State land is managed under the same management practices as management on public land. The BLM establishes the amount of livestock forage available for use on these lands, which are usually isolated sections scattered throughout the allotment. There are 54,063 acres and 1,734 AUMs eligible for exchange of use; inclusion into the proposed management systems would not conflict with management goals. There are no BLM range developments proposed for these State lands.

<u>Washington County Programs</u>. Under the zoning master plan, almost all of the public lands affected by the proposed action are in the Open Space-20 (agricultural purposes and cattle grazing) classification. A few of the areas are included in other Open Space categories, but livestock grazing is one of the conditional uses allowed.

With anticipated future growth of communities in Washington County, public land may be needed to meet increased demands for land. The BLM planning system has recognized this projected need and has designated certain lands, some of which are located in proposed allotments, which may be eligible for disposal. Depending on actual location, acreage and intensity of management, conflicts could arise. Close coordination between county government and BLM would be needed.

Private Programs

Allen-Warner Valley Energy System. The proposed Allen-Warner Valley Energy System would conflict with the proposed Hot Desert action. If the proposed Warner Valley project should materialize, the locations of the reservoir site, powerplant site, and right-of-way corridors would affect the proposed grazing management in the Dome and Fort Pierce Allotments. Approximately 4,872 acres of public land and 284 AUMs would be involved. In addition, the proposed alignment of the canal transporting water to the reservoir would cross the Sand Mountain Allotment and would cause conflicts with the location of range developments.

In the event the Allen-Warner Valley project proceeds, close coordination with the project applicant would be necessary in order to develop mitigating measures designed to reduce conflicts with the Hot Desert proposal. Conflicts could arise on pasture alignment, improvement location, and grazing capacity. Existing range developments would also be affected.

The MFP has recognized this possible conflict and the implementation of these proposed allotment management plans would be delayed pending completion of the environmental statement analyzing the proposed energy system.

If completed, the Warner Valley portion of the proposed energy system could possibly influence existing interdependency and relationships between grazing management on public land and the private sector.

Private Ranching Operations. The interdependency of Federal, private, and other lands in a range livestock operation must be viewed from the standpoint of yearlong forage supplies. The private holdings of

many ranch units cannot supply the necessary forage for all seasons of the year; they must combine grazing of public land with forage produced on other land to obtain a yearlong supply of feed (CAST, 1974).

Data presented in the 1974 Agricultural Survey for Washington County plus information regarding BLM permittees indicate that approximately 66 percent of the beef industry in the county uses public land for some part of their operation. The average grazing season on public land is 5 months.

In the Hot Desert ES area, private lands are generally located along the river drainages, figure 1-13 (all fold-out maps are bound in at the back of this volume), and are used primarily for agricultural production. Some of these properties have base property qualifications and support livestock when not on Federal range.

2

CHAPTER 2

DESCRIPTION OF THE ENVIRONMENT

CHAPTER 2

DESCRIPTION OF THE ENVIRONMENT

INTRODUCTION

This chapter describes, in summary form, environmental components likely to be impacted by the proposed action. Discussions on environmental components related to (1) the broader geographic setting and aspects of ecological, social, and economic interrelationships likely to be impacted, and (2) specific areas which would likely be impacted.

Members of an interdisciplinary team have prepared technical reports which contain detailed information on the environment. Their reports are on file in the Cedar City District Office, Bureau of Land Management (BLM), Cedar City, Utah.

Descriptions presented are designed to be commensurate with the expected magnitude, intensity, duration, and incidence of impacts. The following descriptions are also designed to provide the reader with sufficient understanding of the environment to evaluate possible impacts.

In addition, the probable future environment of the area as it would be without implementation of the proposed action is described.

The following overview of the Hot Desert environment is provided as an introduction to subsequent sections within this chapter.

The Hot Desert area is unique for Utah as it is the northern-most limit of the Mohave Desert. Because of this, a brief explanation of the basic interrelationships is needed to bring the present condition of the ecosystem into perspective.

The range ecosystem, of which man is a part, comprises plant and animal communities along with soil, topography, water, air, temperature, precipitation and solar energy. The outputs of this ecosystem are many and include vegetation, fish, wildlife, livestock, air, recreation, landscape, and open space (Vallentine, 1971). Physical characteristics (climate, topography, and soils) determine the kind of vegetation available and the degree of use it may receive (Stoddart et al., 1975).

One of the most important components of this ecosystem is precipitation. Seasonal distribution, amount, and frequency of sufficient precipitation are particularly important because they determine the type of vegetation, its reproductive capability and growth rate. The evaporation rates for this area are high due to the low humidity, high temperatures and frequent wind. This, coupled with low frequency of precipitation during the growing season, often limits continued plant growth and favors desert shrub vegetation.

The soils of the Hot Desert are influenced by the geology and topography of the area. Topography influences the effect climate has on the geology which, in turn, is the parent material from which the soil profile is developed. The characteristics of the soil influence the kinds of plants that grow in a particular area, and subsequent changes in the soil through development or deterioration result in changes in vegetative composition. In the Hot Desert, this change normally takes place very slowly, although in extreme climatic events, soil losses may occur rapidly.

The plants that grow in this desert environment have developed resistance to the extreme variables of temperature and moisture by having small leaves, being able to grow during moist periods, storing water for long periods, and being able to go into dormancy during dry periods. The native vegetation is particularly drought resistant. Frequently, the most highly adaptive vegetation species in this ecosystem are those not especially palatable to wildlife or livestock, such as most cacti, blackbrush, snakeweed, rabbitbrush, creosote bush, shadscale, etc. Since these plants are better adapted to the extremes in the Hot Desert, they frequently invade areas that once supported palatable forage species.

Of prime importance in the survival of this community is the availability and quality of water. Some desert animals do not drink water but survive on succulent plants in season, living on metabolic water during drought or vegetative dormancy. The characteristics of this desert ecosystem affect the quality and quantity of available water.

The many open spaces between plants, the slow breakdown of persistent litter, steep slopes, high-erosion susceptibility and infrequent storms of high intensity, all influence the hydrologic cycle by determining infiltration rates, runoff, underground flow and water quality. The main water sources contain a high degree of sediment when flowing and this affects the type of fishes that can survive in this harsh environment.

Use of the land in the Hot Desert is dependent on these several components and their interrelationships. This chapter explains the Hot Desert environment and its present condition.

CLIMATE

General. The climate in Washington County, Utah, which is characteristic of the Hot Desert, is semiarid, characterized by low precipitation, low humidity, bright sunshine, and wide diurnal variations in temperature. Climatic conditions at individual locations are strongly dependent on elevation. Higher elevations are characterized by lower temperatures and greater precipitation. The City of St. George is located in a valley in the southern part of Washington County at an elevation of 2,880 feet above sea level, and has a climate more representative of the lower valleys. A climatological summary for St. George is given in table 2-1.

Temperature. The Hot Desert area is characterized by hot summers and relatively short, mild winters. Maximum temperatures in midsummer range from 90° to 100° F depending on elevation. Winter maxima range from 44° to 54° F with minima from 20° to 28° F. Cold spells in the winter are rare and of short duration because of the protection from cold air masses offered by the high mountains to the north and the east.

In St. George, the average date of the last frost in spring is March 31, while the average date of the first frost is October 30, with an average frost-free period of 213 days. Average length of frost-free periods becomes shorter with elevation. At elevations of 5,000 feet or higher the frost-free period generally averages from 150 to 170 days.

Precipitation. Average annual precipitation varies from less than 8 inches in the valleys below 3,000 feet to over 16 inches at elevations of 6,000 feet or higher, (fig. 2-1 foldout). Maximum precipitation amounts occur in winter associated with storm systems from the Pacific Ocean. A secondary maximum occurs during July and August associated with summer thunderstorms. The driest months are May and June.

Mean annual snowfall varies from less than 3 inches in St. George to 40 inches or more in the mountains at elevations above 5,000 feet. Except for the higher elevations in the Pine Valley Mountains, snow cover seldom lasts for more than 1 day.

TABLE 2-1

Climatological Summary - St. George, Utah
1935 to 1970

	Temperature							Precipitation Totals (inches)					
	Means			Extremes							Snow		
Month	Daily Maximum	Daily Minimum	Monthly	Record Highest	Year	Record Lowest	Year	Mean	Greatest Daily	Year	Mean	Maximum Monthly	Year
January	53.5	25.9	39.7	72	1948	-11	1937	0.90	1.41	1943	1.3	15.5	1937
February	59.5	30.8	45.2	79	1957	14	1962	0.89	1.06	1948	0.7	9.0	1939
March	66.6	35.9	51.3	89	1956	19	1962	0.97	1.27	1958	a	2.5	1944
April	76.8	41.8	60.3	96	1936	24	1945	0.53	0.73	1941	0	0	....
May	85.9	51.1	68.5	102	1951	31	1948	0.37	1.52	1958	0	0	....
June	94.9	58.7	76.8	112	1954	39	1955	0.17	0.62	1954	0	0	....
July	101.2	66.2	83.7	112	1939	52	1947	0.60	0.98	1955	0	0	....
August	99.0	65.7	82.4	112	1940	50	1957	0.61	1.30	1945	0	0	....
September	93.1	55.9	74.5	108	1950	37	1965	0.62	1.44	1939	0	0	....
October	80.7	44.3	62.5	99	1963	28	1956	0.67	0.74	1945	0	0	....
November	64.6	30.9	47.8	82	1965	14	1938	0.56	0.96	1946	0	0	....
December	54.8	27.2	41.0	75	1955 June	3	1940 Jan.	0.92	0.98	1942 May	0.7	8.5	1940 Jan.
Annual	77.6	44.7	61.1	112	1954	-11	1937	7.81	1.52	1958	2.7	15.5	1937

[a] Less than half.

Maximum 24-hour precipitation values are generally associated with summer thunderstorms, and sometimes with precipitation in winter. Over a 30-year observation period in St. George, the maximum recorded 24-hour precipitation was 1.52 inches. At higher elevations, precipitation rates tend to be greater. At elevations of 5,000 feet, maximum 24-hour precipitation recordings of about 3.0 inches in a 30-year period are expected (U.S. Department of Commerce, 1968). Intense summer thunderstorms occasionally cause local flashfloods in mountainous areas and canyons. Because of the relatively low precipitation, consideration must also be given to the probability of sufficient moisture during the growing season. Table 2-2 gives the probability statistics based on inches of precipitation from 0.06 to 2.00 inches.

Evaporation. Since 1971, evaporation at St. George has been measured on a routine basis using a Class A evaporation pan which measures evaporation rates slightly higher than normal from large lakes or reservoirs and represents an estimate of potential evaporation. Actual evaporation depends on the amount of water present in the soil, litter, cover, and vegetation.

Monthly evaporation and precipitation for St. George adjusted to correspond to a 30-year mean (from 1941 to 1970) is given in table 2-3. It is evident from the table that, on a monthly basis, the potential evaporation substantially exceeds precipitation. This is particularly true in the early summer months of May and June when climatic conditions are hot and very dry.

Relative Humidity. Relative humidity varies with time of day and season. Lowest humidity occurs during early summer, ranging from 15 to 40 percent, depending on time of day. Highest humidity occurs in winter, ranging between 40 and 60 percent. Relatively higher humidity readings also occur in July and August associated with summer thunderstorms.

Winds. Prevailing winds in the area are generally light and mainly from the southwest. Usually, wind direction and speed are strongly influenced by local topographic conditions. During nighttime when the air cools, air tends to flow down mountain slopes into the valleys; during

TABLE 2-2

Precipitation Means and Probabilities for 1-Week Periods
St. George, Utah

Period Begins	Mean Precipitation (inches)	Percent Probability 0-Trace	Probability (Percent) of Receiving at Least the Following Amounts (in) of Precipitation 0.06	0.10	0.20	0.40	0.60	0.80	1.00	1.40	2.00
March 1	.32	50	46	44	37	25	17	11	8	3	1
March 8	.20	53	43	40	32	20	12	8	5	2	...
March 15	.14	53	40	36	27	15	8	4	2	1	...
March 22	.16	48	40	35	25	13	7	4	2	1	...
March 29	.15	48	40	34	24	12	7	4	2	...	...
April 5	.13	58	31	26	18	9	5	2	1	...	...
April 12	.02	67	21	17	10	5	2	1	1	...	...
April 19	.09	58	30	25	17	8	4	2	1	...	...
April 26	.20	51	40	34	25	12	6	3	2	...	...
May 3	.08	58	34	30	22	12	7	4	2	1	...
May 10	.19	60	32	28	21	12	7	4	3	1	...
May 17	.10	63	28	24	17	9	5	3	2	...	...
May 24	.04	73	21	18	12	6	3	2	1	...	...
May 31	.11	78	18	16	12	7	4	2	2	...	...
June 7	.05	83	13	11	8	5	3	2	1	...	...
June 14	.02	87	9	7	5	2	1	...	...	...	...
June 21	.03	86	11	9	5	2	1	...	...	...	...
June 28	.03	81	16	14	9	4	1	...	...	...	...
July 5	.10	67	28	25	17	7	3	1	...	...	...
July 12	.13	52	39	33	22	10	5	2	1	...	...
July 19	.15	44	42	36	24	11	6	3	1	...	...
July 26	.14	41	45	38	26	12	6	3	1	...	...
August 2	.18	43	48	42	30	16	8	4	2	...	...
August 9	.21	48	45	41	29	15	7	4	2	...	...
August 16	.07	53	39	33	22	10	5	2	1	...	...
August 23	.15	57	35	31	22	11	6	3	2	1	...
August 30	.15	61	34	31	25	15	10	6	4	2	...
September 6	.23	68	27	25	21	14	9	7	5	2	1
September 13	.05	73	21	19	15	9	6	4	3	1	...
September 20	.12	66	28	25	19	10	6	3	2	...	...
September 27	.16	58	36	32	24	14	8	4	2	1	...
October 4	.15	59	34	30	23	13	8	5	3	1	...
October 11	.14	63	31	28	21	13	8	5	3	1	...
October 18	.18	64	31	29	23	15	9	6	3	1	...
October 25	.14	68	30	28	23	14	8	5	3	1	...
November 1	.13	66	30	28	23	14	8	5	3	1	...
November 8	.21	56	37	34	26	15	9	6	3	1	...
November 15	.13	54	38	34	24	13	7	4	2	1	...
November 22	.10	58	35	31	23	12	6	3	2	...	...
November 29	.19	53	42	38	29	17	10	5	3	1	...
December 6	.24	49	46	42	34	21	13	8	5	2	...
December 13	.21	53	42	39	32	20	13	8	5	2	...
December 20	.20	51	43	39	30	19	12	7	4	2	...
December 27	.20	48	44	40	31	18	10	6	3	1	...
January 3	.16	49	45	41	31	17	9	5	3	1	...
January 10	.22	48	47	43	34	20	12	7	4	2	1
January 17	.31	47	47	43	34	22	14	10	7	3	1
January 24	.20	43	49	45	36	23	15	9	6	3	1
January 31	.33	40	53	49	40	26	16	10	6	2	...
February 7	.24	42	51	47	38	24	15	10	6	2	...
February 14	.22	45	48	44	35	22	14	8	5	2	...
February 21	.26	48	48	45	37	24	16	10	7	3	1

Source: Gifford et al., 1967

TABLE 2-3

Average Monthly Pan Evaporation/Precipitation, St. George, Utah

Month	Evaporation[a] (inches)	Precipitation (inches)
January	2.2	0.88
February	3.0	0.83
March	5.8	0.90
April	8.2	0.52
May	11.4	0.38
June	13.7	0.19
July	13.5	0.61
August	11.1	0.64
September	8.9	0.48
October	6.1	0.57
November	3.2	0.69
December	2.1	0.87
TOTAL	88.2	7.56

Source: Arlo Richardson, Utah State Climatologist 1976: personal communication.

[a]Bureau of Reclamation estimates.

daytime, the wind tends to be reversed, although the pattern is not as discernible.

AIR QUALITY

Washington County and the surrounding areas are generally free of man-made pollution sources. An observation program of background levels of various atmospheric pollutants in Warner Valley, southeast of St. George, generally reveals very clean air.

GEOLOGY AND TOPOGRAPHY

Washington County is a region with two distinctly different patterns of relief features. These features and their underlying bedrock are among the factors that influence soils, topography, precipitation and wind movements.

The western portion of the county is characterized by tilted fault-block mountains and ridges with broad intervening sediment-filled basins. Outcrops of igneous rock are common in this portion.

The eastern portion of the county is characterized by horizontal to gently dipping sedimentary strata containing numerous linear plateaus, long, widely spaced north-south trending folds, and faults of considerable displacement. One such fault, the most prominent structural feature of the county, is the Hurricane Fault. This fault, with a maximum elevation differential of 8,000 feet is over 150 miles in length. This elevation differential is clearly evident and is represented by the west-facing Hurricane Cliffs. The Hurricane Cliffs bisect the county separating the two different patterns of relief features (fig. 2-2 foldout).

Except for the most southern and eastern portions of the county, the most important rock type is the Navajo Sandstone, an excellent aquifer. The location of these aquifers influences water developments for livestock, wildlife, and man. Other rock types in the county include shale, limestone, conglomerate, and volcanic intrusive and metamorphic rocks (fig. 2-2).

Resistance of the various strata to erosion has determined much of the topographic character of the county. Elevations range from 2,200 feet above sea level in the Beaver Dam Wash to 7,746 feet above sea level in the Beaver Dam Mountains (fig. 2-2).

Much of the public land in the county is mountainous and steep. The rapid elevation differentials cause great differences in precipitation, wind movement, and temperature. These variances cause a great diversity in the way the natural resources of the county must be managed.

SOILS

Introduction. The distribution and characteristics of soils in the Hot Desert area strongly exhibit the influence of climatic and topographic features (fig. 2-3).

Soils formed in the desert basins of this area are limited in their development and are typically recent in origin. Their profiles reflect the character of the parent material from which they were derived and their limited productive capability is a result of low precipitation and subsequent low organic matter content. Desert soils in this area are generally coarse textured and may have a calcareous hardpan layer beneath the surface.

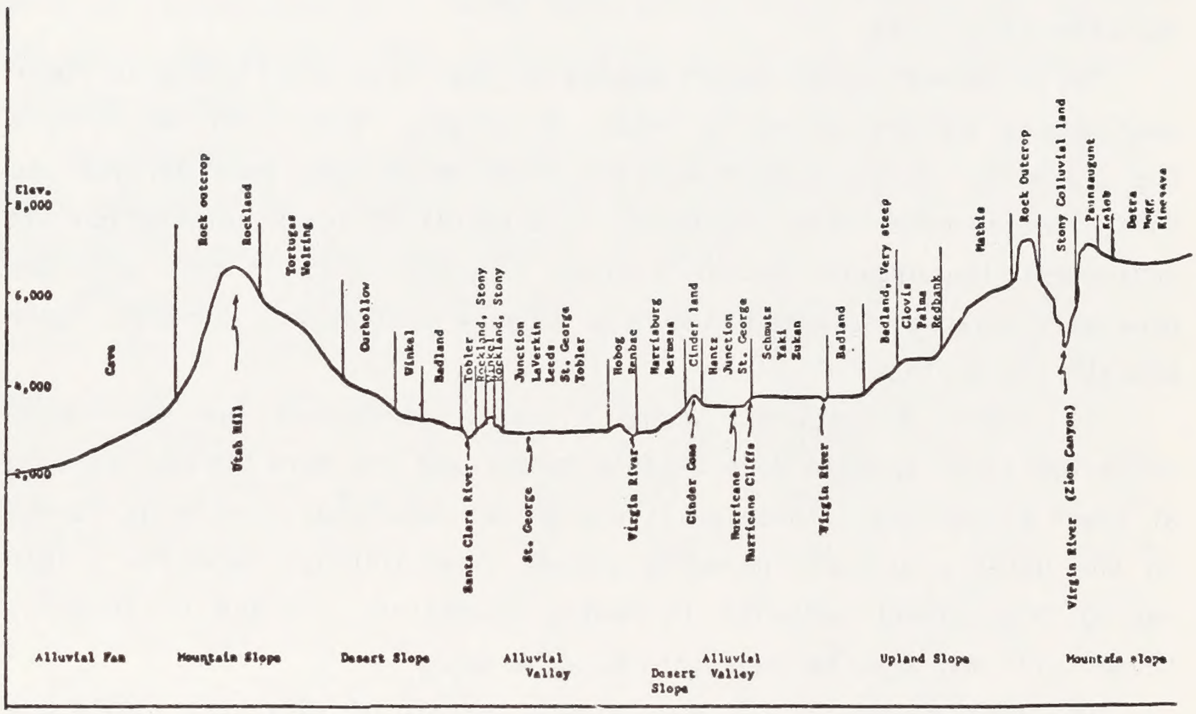
At higher elevations, where climatic conditions are favorable, soils typically contain more organic matter and are more productive than at lower elevations. These soils are better developed than soils formed in the deserts and are normally formed from alluvial deposits originating from parent material in nearby mountains. In the Hot Desert, these soils may also be underlain by a hardpan.

On steep slopes in the mountainous terrain of this area, soils are typically shallow, have a coarse, gravely texture, and are well drained.

Most of the soils in the Hot Desert area are predominantly alluvial in origin. In addition, there are some small areas derived from coarse-grained igneous rock that have coarse textures and are normally well drained.

In 1973 the Soil Conservation Service (SCS) conducted a detailed soil survey in Washington County, which covers most of the ES area. One hundred and three individual soil series were identified, described, mapped, and grouped into 15 soil associations. That portion of the statement area in Arizona was divided into two additional associations described as part of the Statewide soil association map developed by SCS for Arizona.

Soil Description. The soil associations of the Hot Desert area are shown in figures 2-3 (foldout) and 2-4. Table 2-4 contains a detailed



Source: SCS Soil Survey of Washington County -unpublished

Figure 2-4

SOIL DISTRIBUTION IN RELATION TO TOPOGRAPHY HOT DESERT AREA

TABLE 2-4

Soil Association Description and Production

Association	Percent of Area Covered by ES	Soil Texture		Depth (Inches)	Permeability (Inches Per Hour)	Available Water Holding Capacity (Inches of Water Per Foot of Soil)	Typical Vegetation	Erosion Potential	Limiting Properties	Potential Production (Pounds of Vegetation, Dry Weight, Per Acre)[a]
		Surface	Subsurface							
Tobler - Harrisburg Junction	4.5	Fine sandy loam to silty clay loam	Sandy loam to sandy clay	20 to 60	0.06 to 6.0	1.50	Shadscale, 4-wing saltbush, Black-brush, Rabbit-brush Big sage, Creosote bush	Slight to moderate	....	660
Winkel - Rock Land	2.6	Gravelly sandy loam to clay loam	Very gravelly sandy loam to very cobbly sandy clay loam	0 to 20	0.06 to 6.0	0.76	Shadscale, 4-wing saltbush, Rabbit-brush, Blackbrush Spiny hop sage, Big sage	Slight to high	Hardpan at 11 to 19 inches in some areas	245
Pintura - Toquerville - Dune Land	3.6	Sand to sandy loam	Sand to sandy clay loam	12 to 60	0.6 to 20	0.88	Snakeweed, Rabbit-brush, Blackbrush Creosote bush, Big sage	Slight to high	....	430
Cave	17.3	Gravelly sandy loam to clay loam	Gravelly sandy loam to clay loam	12 to 20	2.0 to 6.0	1.00	Creosote bush, Blackbrush, Range ratany	Slight	Hardpan at 12 to 20 inches	580
Badland - Eroded Land	13.0	Essentially no effective soil	Essentially no effective soil	0 to 20	0.6 to 2.0	Negligible	Cheatgrass, Russian thistle, Foxtail brome, Shad scale, Big sage, Blue grama	Moderate to high	Shallow soils	90
Bond - Rock Land	3.8	No soil to sandy loam	No soil to gravelly sandy clay	0 to 20	0.2 to 0.6	1.00	Blue grama, Galleta, Big sage, Blackbrush	Moderate to high	Bedrock near surface	1,050
Rock Land - Mathis	4.8	No soil to very gravelly loamy fine sand	No soil to very gravelly loamy sand	0 to 36	0.2 to 6.0	1.00	Big sage, Black-brush, Mormon tea	High	Bedrock near surface. Strongly alkaline in some areas	345
Rock Outcrop - Rock Land	10.9	Essentially no effective soil	Essentially no effective soil	No soil	No soil	Negligible	....	Slight	Shallow soils	0
Naplene - Redbank - Schmutz	3.1	Loamy fine sand to loam	Fine sandy loam to clay	36 to 60	0.2 to 6.0	1.50	Shadscale, Spiny hop sage, Blue grama, Galleta, Big sage	Slight to moderate	....	780

Source: Interpreted from Soil Conservation Service Data, 1973. Soil Survey, Washington County, Utah.

[a]Average dry weight production for site in excellent ecological condition and in a year of average precipitation.

(continued)

TABLE 2-4 (concluded)

Association	Percent of Area Covered by ES	Soil Texture: Surface	Soil Texture: Subsurface	Depth (Inches)	Permeability (Inches Per Hour)	Available Water Holding Capacity (Inches of Water Per Foot of Soil)	Typical Vegetation	Erosion Potential	Limiting Properties	Potential Production (Pounds of Vegetation, Dry Weight, Per Acre)[a]
Mespun - Rock Land	0.9	Fine sand to fine sandy loam	Fine sand to fine sandy loam	36 to 60	0.6 to >20	0.88	Blackbrush, Cliff-rose, Mormon tea	Slight to moderate	....	780
Curhollow - Pastura - Magotsu	12.1	Gravelly fine sandy loam to very cobbly clay loam	Gravelly loam to clay	12 to 20	0.6 to 2.0	0.76	Blue grama, Galleta, Big sage	Moderate	Hardpan at 12 to 20 inches	460
Motoqua - Quazo - Dagflat	12.5	Gravelly sandy loam	Gravelly sandy clay loam	12 to 36	0.6 to 2.0	1.50	Blackbrush, Rabbitbrush, Big Sage	Moderate	Bedrock near	995
Welring - Tortugas - Rock Outcrop	4.5	Very gravelly loam to gravelly loam	Very gravelly loam to gravelly loam	12 to 60	0.6 to 6.0	1.00	Blackbrush, Rabbitbrush	High	Bedrock near surface in some areas	765
Collbran - Tacan - Nehar	3.5	Very stony sandy loam to very cobbly clay loam	Very gravelly fine sandy clay to clay	20 to 60	0.06 to 2.0	2.00	Blue grama, Galleta, Big sage Blackbrush	Moderate	....	855
Paunsaugunt - Kolob - Datcan	0.3	Fine sandy loam to cobbly loam	Very gravelly loam to clay	12 to 60	0.06 to 2.0	2.00	Blackbrush, Cliffrose, Mormon tea, Bursage	Slight to moderate	Bedrock near surface in some areas	1,195
Barkerville - Gaddes - Rock - Outcrop[a]	0.9	Sandy loam	Sandy loam to gravelly clay loam	0 to 36	Unknown	Unknown	Blue grama, Galleta, Blackbrush, Mormon tea	High	....	Not Available
Anthony - Vinton - Aqua[b]	1.7	Sandy loam to loam	Sandy loam to loam	>60	Unknown	Unknown	Blue grama, Galleta, Blackbrush, Mormon tea	Moderate	....	Not Available

[a]Average dry weight production for site in excellent ecological condition and in a year of average precipitation.

[b]Association found in Arizona

description of the 17 soil associations. Specific information was obtained from the 1973 SCS Soil Survey. Appendix V shows soil associations found in each allotment.

Production Potentials. Soil production potentials were estimated for each soil association using SCS range site descriptions developed for individual soils found within each soil association. These potentials were calculated in pounds of air-dry vegetation produced per acre each year. These estimates can be found in table 2-4.

Current Erosion. In the Hot Desert area, soil loss from erosion occurs by two agents, wind and water. Removal of ground cover increases overland flow of sediment and accelerates soil losses. Soil compaction reduces infiltration rates and accelerates soil loss. Erosion of soil reduces its ability to produce vegetation. Loss of plant nutrients (fertility) by erosion reduces the productive capacity of the soil.

In determining specific rates of sediment yield by allotment (table 2-5) erosion rates were not grouped. Specific rates of sediment yield were used as determined at each sample point. Current erosion was evaluated using methods that evaluate those factors which influence the rate and likelihood of erosion (see Appendix VI for detailed methodology). This information on most of the area was obtained by BLM in the fall of 1975; additional information for the Hot Desert area was gathered during 1976. Actual sediment yield data collected by the SCS for specific sites in the Washington County area were used to calibrate erosion estimates made by BLM. The information in table 2-5 indicates that current erosion for all the allotments is highly variable. Erosion losses may vary from 0.12 to over 17 acre-feet per square mile per year; the average for all allotments is 3.5.

Erosion Potential (Susceptibility). The erosion potential of a soil is determined by several important physical factors and soil properties. The Washington County soil survey compiled by SCS determined erosion potential by considering the following factors: rock fragments, percent sand, silt and clay, organic matter, structure, permeability, and slope.

Similar criteria were used to determine erosion potentials of that portion of the area in Arizona. Based on these criteria, the statement area in both Utah and Arizona was grouped into three erosion potential classes. Because of the variable nature and complexity of soil associations the most limiting of actions were considered in determining the erosion potential. Twenty-eight percent of the area was found to be in a slight erosion class, 39 percent - moderate and 33 percent - high.

When more than one erosion potential class was found within each soil association, the higher value was used to indicate erodibility for that association. The erosion potentials for each allotment are also shown on table 2-5.

TABLE 2-5

Erosion Potential and Sediment Yield

Allotments	Erosion Potential (Acres) Slight	Moderate	High	Total	Present Erosion[a]
Alger Hollow					
Alger Hollow	5,280	3,344	176	8,800	3.67
Diamond Valley	....	1,730	....	1,730	0.55
Wide Canyon	....	6,250	....	6,250	2.50
Sand Wash	4,410	2,590	......	7,000	3.18
Apex Slope					
Apex Slope	....	3,527	2,352	5,879	2.01
Beaver Dam Slope					
Indian Spring	11,342	5,992	4,066	21,400	8.62
Castle Cliffs	10,798	....	1,262	12,060	6.43
Santa Clara/ Beaver Dam Slope	25,321	5,080	4,629	35,030	7.21
Big Mountain					
Big Mountain	....	9,126	....	9,126	4.31

Source: Interpreted from information contained in SCS 1973 Soil Survey of Washington County; present erosion interpreted from methods developed by Pacific Southwest Interagency Committee and BLM (Appendix VI).

[a]Soil loss in acre-feet per square mile per year.

(continued)

TABLE 2-5 (continued)

Allotments	Erosion Potential (Acres)				Present Erosion[a]
	Slight	Moderate	High	Total	
Boomer Hill					
Boomer Hill	555	385	....	940	0.91
Cove Wash	779	1,829	779	3,387	4.91
Boot Spring					
Boot Spring	....	....	2,118	2,118	2.94
Bull Mountain					
Bull Mountain	958	13,358	203	14,519	7.45
Central					
Central	....	2,920	....	2,920	1.52
Coalpits and Fault					
Coalpits	....	1,515	1,010	2,525	1.19
Fault	....	463	322	785	1.20
Cougar Canyon					
Cougar Canyon	....	9,150	....	9,150	5.05
Curly Hollow					
Curly Hollow	2,297	4,364	16,311	22,972	15.42
Dagget Flat					
Dagget Flat	....	4,127	....	4,127	2.50
Desert Inn					
Desert Inn	5,547	19,046	12,390	36,983	17.16
Dome					
Dome	....	1,422	766	2,188	1.47
Warner Valley	....	123	757	880	1.26
Fort Pierce					
Fort Pierce, UT	2,763	1,658	4,788	9,209	8.88
Spendlove	765	5,664	1,225	7,654	7.91
Fort Pierce, AZ	....	8,844	4,974	13,818	15.12
Gooseberry					
Gooseberry	....	....	4,440	4,440	2.03
Grafton					
Grafton	....	....	7,258	7,258	5.33

[a]Soil loss in acre-feet per square mile per year. (continued)

TABLE 2-5 (continued)

Allotments	Erosion Potential (Acres)				Present Erosion[a]
	Slight	Moderate	High	Total	
Gunlock					
Gunlock	2,787	3,547	....	6,334	3.09
Herd House					
Herd House	344	1,952	574	2,870	1.57
Hurricane					
Hurricane	....	2,029	41	2,070	2.28
Hurricane Fault					
Eagle	....	287	1,308	1,595	1.02
Terrace	....	2,484	1,874	4,358	2.01
Frog Hollow	573	2,032	....	2,605	4.36
Workman Wash	676	1,312	....	1,988	0.90
Gould	....	4,897	3,403	8,300	6.69
Gould Ranches	....	580	....	580	0.20
Hurricane Mesa					
Hurricane Mesa	....	204	6,607	6,811	3.93
Jackson Wash					
Jackson Wash	8,030	11,759	8,891	28,680	14.73
Land Hill					
Land Hill	....	....	1,030	1,030	0.57
Little Creek					
Little Creek	....	....	14,595	14,595	7.62
Mesa					
Mesa	....	....	2,580	2,580	1.64
Minera Wash					
Minera Wash	1,530	3,107	....	4,637	.59
Red Cliffs					
Silver Reef	670	500	....	1,170	0.64
Leeds	899	....	1,744	2,643	1.87
Red Cliffs	4,058	812	5,274	10,144	4.98
Sand Mountain					
Sand Mountain	700	1,960	11,340	14,000	11.87
Sand Mountain Spring	....	1,679	251	1,930	1.41
Sand	....	1,443	3,712	5,155	4.25

[a]Soil loss in acre-feet per square mile per year.

(continued)

TABLE 2-5 (continued)

Allotments	Erosion Potential (Acres) Slight	Moderate	High	Total	Present Erosion[a]
Sandstone Mountain					
Sandstone Mountain	....	734	1,797	2,531	1.75
Santa Clara Creek					
Santa Clara Creek	....	....	3,038	3,038	3.81
Scarecrow Peak					
Terry	10,350	....	....	10,350	3.77
Beaver Dam Wash	24,982	1,880	....	26,862	9.52
Cat Claw	3,410	....	....	3,410	1.15
Snow Holding Pasture	350	3,145	....	3,495	0.90
Short Creek					
Short Creek	....	1,138	845	1,983	2.41
Canaan Gap	....	1,773	843	2,616	1.25
Canyon	....	....	581	581	1.13
Smith Mesa					
Smith Mesa	....	1,533	407	1,940	1.86
Toquerville					
Toquerville	1,136	189	3,409	4,734	2.97
Ash Creek	....	1,655	184	1,839	0.41
LaVerkin	182	263	1,576	2,021	1.30
Pintura	1,265	844	372	2,481	1.39
Trail					
Trail	....	1,127	2,093	3,220	5.14
Twin Peaks					
Twin Peaks	3,460	18,456	6,920	28,836	16.40
Veyo					
Veyo	2,981	5,075	....	8,056	4.47
Virgin					
Virgin	....	245	4,645	4,890	6.18
Mountain Dell	....	....	1,600	1,600	0.22
Warner Ridge					
Warner Ridge	....	716	1,168	1,884	3.38

[a]Soil loss in acre-feet per square mile per year. (continued)

TABLE 2-5 (continued)

Allotments	Erosion Potential (Acres)				Present Erosion[a]
	Slight	Moderate	High	Total	
Washington					
Washington	7,714	2,051	....	9,765	3.78
White Dome					
White Dome	....	1,754	753	2,507	0.55
SUB TOTAL	146,915	195,663	163,284	505,862	
CUSTODIAL					
Airport					
Airport	....	147	....	147	0.26
Black Canyon					
Black Canyon	....	264	336	600	0.66
Box Canyon					
Box Canyon	119	....	540	659	0.21
Cinder Mountain					
Cinder Mountain	....	246	1,994	2,240	1.42
Dalton Wash					
Dalton Wash	....	333	522	855	0.36
Lamoreaux					
Lamoreaux	....	80	80	160	0.18
Little Plain					
Little Plain	....	37	893	930	0.46
North Grafton					
North Grafton	....	500	....	500	0.25
Red Butte					
Red Butte	384	....	510	894	0.92
Rock Springs					
Rock Springs	....	205	615	820	0.68
Sand Hills					
Sand Hills	....	....	992	992	1.32

[a]Soil loss in acre-feet per square mile per year. (continued)

TABLE 2-5 (concluded)

Allotments	Erosion Potential (Acres) Slight	Moderate	High	Total	Present Erosion[a]
Sand Wash Reservoir					
Sand Cove	....	640	....	640	0.40
Stout					
Stout	....	7	228	235	0.12
Yellow Knolls					
Yellow Knolls	525	....	....	525	0.14
SUB TOTAL	1,028	2,459	6,710	10,197	
ELIMINATION OF GRAZING					
LaVerkin Creek					
LaVerkin Creek	322	4,286	6,108	10,716	8.30
Pace Knoll					
Pace Knoll	....	1,885	....	1,885	1.10
Pintura Seeding					
Pintura	....	904	....	904	0.21
SUB TOTAL	322	7,075	6,108	13,505	
TOTAL	148,265	205,197	176,102	529,564	

[a]Soil loss in acre-feet per square mile per year.

VEGETATION

Vegetative Types. The land surface of Washington County and surrounding area supports a great variety of plant species. This variety is due to the diversity of soil types, elevation, exposure, temperature, precipitation, and existing as well as past use. An area that supports vegetation and has one to several dominant or codominant species is identified as a vegetative type usually named after the dominant or most abundant species. These vegetative types vary greatly in the number of species and percent of each species in the total composition. For instance, a sagebrush vegetative type could be made up of 100 percent sagebrush or as little as 10 percent sagebrush, as long as it is the dominant species in terms of overall aspect. For the purpose of this statement, all vegetation has been placed into one of the following types: Desert Shrub, Pinyon-juniper, Sagebrush, Joshua tree, Creosote Bush, Grass, Halfshrub, Saltbush, and annuals. Appendix VII contains a narrative description of each vegetative type. In addition to these nine types, there are several thousand acres of public land that are unsuitable for livestock grazing because of steepness, low forage productivity or other limiting factors and which are not delineated as vegetative types, although these areas do support vegetation. Acres of vegetative types by allotment are shown in table 2-6. Riparian vegetation will be discussed separately because of its uniqueness and location.

Information on vegetation was obtained from data gathered from existing BLM forage surveys which used the ocular reconnaissance technique. These data are available in the BLM Cedar City District Office in the Allotment Management Plan files. During the fall of 1975 and throughout 1976, BLM completed new surveys where needed and rechecked older surveys for accuracy, making adjustments as necessary. From the survey information, vegetative types for each allotment (table 2-6) were identified and the cover, species composition, and carrying capacity for livestock and wildlife were determined. The physiological requirements of the key forage species were considered in each allotment. Because of

TABLE 2-6

Vegetative Types Allocated for Livestock Forage

Allotment	Total Acres	Desert Shrub	Pinyon-Juniper	Sage-brush	Joshua Tree	Creosote Bush	Grass	Half Shrub	Annuals	Salt Brush	Unallocated[a]
Alger Hollow											
Alger Hollow	8,800	3,300	......	2,630	......	.....	.....	590	.....	.....	2,280
Diamond Valley	1,730	660	......	720	......	.....	350	.....	.....	.....	......
Wide Canyon	6,250	450	5,610	190	......	.....	.....	.....	.....	.....	......
Sand Wash	7,000	......	3,090	.....	......	.....	.....	.....	.....	.....	3,910
Apex Slope											
Apex Slope	5,879	2,905	......	1,369	......	.....	.....	1,205	.....	.....	400
Beaver Dam Slope											
Santa Clara/ Beaver Dam Slope	35,030	21,378	......	168	2,328	7,668	.....	1,578	.....	.....	1,910
Indian Spring	21,400	10,072	2,452	3,492	3,292	.....	.....	152	.....	.....	1,940
Castle Cliffs	12,060	3,457	1,147	.....	5,647	.....	.....	.....	.....	.....	1,809
Big Mountain											
Big Mountain	9,126	6,253	......	.....	......	.....	.....	.....	.....	.....	2,873
Boomer Hill											
Boomer Hill	940	940	......	.....	......	.....	.....	.....	.....	.....	......
Cove Wash	3,387	2,782	......	.....	......	.....	.....	.....	.....	.....	605
Boot Spring											
Boot Spring	2,118	1,665	......	.....	......	.....	.....	.....	.....	.....	453
Bull Mountain											
Bull Mountain	14,519	1,005	1,305	.....	......	.....	.....	.....	.....	.....	12,209
Central											
Central	2,920	......	......	.....	......	.....	1,960	.....	.....	.....	960
Coalpits and Fault[b]											
Coalpits	2,525	370	......	990	......	.....	825	.....	.....	.....	340
Fault	785	605	......	.....	......	.....	180	.....	.....	.....	......
Cougar Canyon											
Cougar Canyon	9,150	......	6,342	.....	......	.....	.....	.....	.....	.....	2,808
Curly Hollow											
Curly Hollow	22,972	15,337	......	.....	......	.....	.....	.....	2,067	1,500	4,068

NOTE: Data on vegetation types gathered according to the BLM Range Manual.

[a]Unallocated refers to vegetation unsuitable for livestock forage.
[b]Custodial management included in intensive management allotments.

(continued)

TABLE 2-6 (continued)

Allotment	Acres	Desert Shrub	Pinyon-Juniper	Sage-brush	Joshua Tree	Creosote Bush	Grass	Half Shrub	Annuals	Salt Brush	Unallocated[a]
Dagget Flat											
Dagget Flat	4,127	......	2,737	.....	......	.....	710	.....	.....	.....	680
Desert Inn											
Desert Inn	36,983	3,476	12,356	.....	......	.....	2,378	.....	.....	.....	18,773
Dome											
Dome	2,188	852	......	519	......	334	.....	.....	.....	.....	483
Warner Valley	880	......	......	475	......	125	.....	.....	.....	.....	280
Fort Pierce											
Fort Pierce, Utah	9,209	4,884	......	1,260	......	10	.....	655	.....	.....	2,400
Fort Pierce, Arizona	13,818	7,094	......	.....	......	.....	5,104	.....	.....	.....	1,620
Spendlove	7,654	4,586	......	.....	......	1,098	.....	740	.....	270	960
Gooseberry											
Gooseberry	4,440	......	2,240	.....	......	.....	2,200	.....	.....	.....	......
Grafton											
Grafton	7,258	3,788	1,090	.....	......	.....	.....	.....	.....	.....	2,380
Gunlock											
Gunlock	6,334	4,183	411	284	......	.....	.....	.....	.....	.....	1,456
Herd House[b]											
Herd House	2,870	319	......	.....	......	798	1,031	.....	.....	.....	722
Hurricane[b]											
Hurricane	2,070	530	......	.....	......	800	250	.....	.....	.....	490
Hurricane Fault											
Eagle	1,595	143	377	430	......	.....	.....	.....	.....	.....	645
Terrace	4,358	2,395	1,385	.....	......	.....	.....	.....	.....	.....	578
Frog Hollow	2,605	2,545	......	.....	......	.....	.....	.....	.....	.....	60
Workman Wash	1,988	1,580	......	.....	......	.....	.....	.....	.....	.....	408
Gould	8,300	6,066	307	1,266	......	.....	.....	.....	.....	.....	661
Gould Ranch	580	580	......	.....	......	.....	.....	.....	.....	.....	......
Hurricane Mesa[b]											
Hurricane Mesa	6,811	......	4,021	.....	......	.....	.....	.....	.....	.....	2,790
Jackson Wash											
Jackson Wash	28,680	18,634	7,169	.....	160	287	.....	.....	.....	.....	2,430

[a]Unallocated refers to vegetation unsuitable for livestock forage.
[b]Custodial management included in intensive management allotments.

(continued)

TABLE 2-6 (continued)

Allotment	Acres	Desert Shrub	Pinyon-Juniper	Sage-brush	Joshua Tree	Creosote Bush	Grass	Half Shrub	Annuals	Salt Brush	Unallocated[a]
Land Hill											
Land Hill	1,030	1,000	......	.....	......	.....	.....	.....	.....	.....	30
Little Creek											
Little Creek	14,595	......	9,346	464	......	.....	1,922	318	.....	.....	2,545
Mesa[b]											
Mesa	2,580	......	2,080	.....	......	.....	.....	.....	.....	.....	500
Minera Wash											
Minera Wash	4,637	739	2,433	1,173	......	.....	.....	.....	.....	.....	292
Red Cliffs											
Red Cliffs	10,144	2,454	1,116	.....	......	.....	.....	1,901	.....	720	3,953
Silver Reef	1,170	450	......	.....	......	.....	.....	680	.....	.....	40
Leeds	2,643	1,443	......	.....	......	.....	.....	720	.....	.....	480
Sand Mountain											
Sand Mountain	14,000	5,140	......	4,320	......	.....	.....	2,350	.....	.....	2,190
Sand	5,155	2,185	......	2,250	......	.....	.....	80	.....	.....	640
Sand Mountain Spring	1,930	400	......	1,310	......	.....	.....	220	.....	.....	......
Sandstone Mountain											
Sandstone Mountain	2,531	2,191	......	.....	......	.....	.....	.....	.....	.....	340
Santa Clara Creek											
Santa Clara Creek	3,038	2,693	......	.....	......	.....	.....	.....	.....	.....	345
Scarecrow Peak[b]											
Catclaw	3,410	......	......	.....	2,860	.....	.....	.....	.....	.....	550
Terry	10,350	550	......	.....	8,820	980	.....	.....	.....	.....	......
Beaver Dam Wash	26,862	5,278	3,600	.....	17,124	.....	.....	.....	.....	.....	860
Snow Holding Pasture	3,495	......	......	3,495	......	.....	.....	.....	.....	.....	......
Short Creek											
Short Creek	1,983	14	......	.....	......	.....	605	.....	.....	794	570
Canaan Gap	2,616	517	......	.....	......	.....	1,217	.....	.....	229	653
Canyon	581	......	436	.....	......	.....	.....	.....	.....	.....	145
Smith Mesa											
Smith Mesa	1,940	......	1,540	.....	......	.....	.....	.....	.....	.....	400

[a]Unallocated refers to vegetation unsuitable for livestock forage.
[b]Custodial management included in intensive management allotments.

(continued)

TABLE 2-6 (continued)

Allotment	Acres	Desert Shrub	Pinyon-Juniper	Sage-brush	Joshua Tree	Creosote Bush	Grass	Half Shrub	Annuals	Salt Brush	Unallocated[a]
Toquerville											
Toquerville	4,734	295	......	.....	......	.....	.....	.....	140	.....	4,299
Pintura	2,481	800	......	.....	......	.....	748	.....	.....	.....	933
Ash Creek	1,839	1,679	......	.....	......	.....	.....	.....	.....	.....	160
LaVerkin	2,021	1,042	......	.....	......	.....	.....	.....	.....	.....	979
Trail											
Trail	3,220	1,590	......	.....	......	.....	.....	1,600	.....	.....	30
Twin Peaks											
Twin Peaks	28,836	2,595	12,876	1,730	......	.....	2,306	.....	.....	.....	9,329
Veyo											
Veyo	8,056	......	1,772	3,855	......	.....	564	.....	.....	.....	1,865
Virgin[b]											
Virgin	4,890	2,440	......	500	......	.....	.....	400	.....	.....	1,550
Mountain Dell	1,600	......	740	.....	......	.....	.....	.....	.....	.....	860
Warner Ridge											
Warner Ridge	1,884	495	......	.....	......	.....	.....	.....	.....	310	1,079
Washington											
Washington	9,765	1,720	950	.....	......	.....	.....	730	.....	.....	6,365
White Dome[b]											
White Dome	2,507	1,691	......	.....	......	5	.....	.....	....	.....	811
SUB TOTAL	505,862	172,235	88,928	32,890	40,231	12,105	22,350	13,919	2,207	3,823	117,174
CUSTODIAL											
Airport											
Airport	147	147	......	.....	......	.....	.....	.....	.....	.....	......
Black Canyon											
Black Canyon	600	......	426	.....	......	.....	.....	.....	.....	.....	174
Box Canyon											
Box Canyon	659	590	......	.....	......	.....	.....	.....	.....	.....	69
Cinder Mountain											
Cinder Mountain	2,240	80	1,830	.....	......	.....	.....	.....	.....	.....	330

[a]Unallocated refers to vegetation unsuitable for livestock forage.
[b]Custodial management included in intensive management allotments.

(continued)

TABLE 2-6 (concluded)

Allotment	Acres	Desert Shrub	Pinyon-Juniper	Sage-brush	Joshua Tree	Creosote Bush	Grass	Half Shrub	Annuals	Salt Brush	Unallocated[a]
Dalton Wash											
Dalton Wash	855	175	240	.....	......	.....	.....	140	.....	.....	300
Lamoreaux											
Lamoreaux	160	......	80	80	......	.....	.....	.....	.....	.....	......
Little Plain											
Little Plain	930	340	400	.....	......	.....	.....	.....	.....	.....	190
North Grafton											
Grafton	500	115	......	.....	......	.....	.....	.....	.....	.....	385
Red Butte											
Red Butte	894	......	130	90	......	.....	.....	.....	.....	.....	674
Rock Spring											
Rock Spring	820	......	697	33	......	.....	.....	.....	.....	.....	90
Sand Hills											
Sand Hills	992	680	......	172	......	.....	.....	.....	.....	.....	140
Sand Wash Reservoir											
Sand Cove	640	......	......	380	......	.....	.....	.....	.....	.....	260
Stout											
Stout	235	......	30	.....	......	.....	.....	.....	.....	.....	205
Yellow Knolls											
Yellow Knolls	525	324	......	.....	......	.....	.....	.....	.....	.....	201
SUB TOTAL	10,197	2,451	3,833	755	0	0	0	140	0	0	3,018
ELIMINATION OF GRAZING											
LaVerkin Creek											
LaVerkin Creek	10,716	1,300	740	.....	......	.....	.....	.....	.....	.....	8,676
Pace Knoll											
Pace Knoll	1,885	......	180	.....	......	.....	.....	.....	.....	.....	1,705
Pintura Seeding											
Pintura	904	......	......	.....	......	.....	904	.....	.....	.....	......
SUB TOTAL	13,505	1,300	920	0	0	0	904	0	0	0	10,381
TOTAL	529,564	175,986	93,681	33,645	40,231	12,105	23,254	14,059	2,207	3,823	130,573

[a]Unallocated refers to vegetation unsuitable for livestock forage.
[b]Custodial management included in intensive management allotments.

variations in each allotment relating to elevation, precipitation, and seasonal growth of key species, average plant phenology for the ES area is shown on table 2-7. Specific phenological data by allotment can be found in the AMP file at the Cedar City District Office. Figure 2-5 (foldout bound in the back of this volume) indicates the distribution of vegetation and table 2-8 presents supporting information.

Areas of No Livestock Forage Allocation. Because of steep rocky terrain, lack of water, inaccessibility, and/or low forage productivity, 130,573 acres (24 percent), supporting a variety of vegetative types, were not considered suitable for livestock grazing. No livestock forage was allocated on these areas. Even though these areas are used by wildlife, they are only lightly used by domestic livestock. These areas are scattered throughout the county but are more prevalent near Red Mountain, Hurricane Mesa, Desert Inn, Bull Mountain, Sand Mountain, and Little Creek Mountain. The larger topographic areas are shown on figure 2-5.

Riparian Vegetation. Within the study area, there are 16 streams passing through 31 allotments on public lands for a total of 86.5 miles. It is assumed the 86.5 miles of perennial water supports riparian vegetation. This represents about 63 percent of the total riparian vegetation (see also Fisheries Habitat, this chapter). Riparian vegetation is considered to be vegetation that is associated with permanent water. This unique vegetation is generally found growing along stream banks, bodies of water, and around moist areas such as springs and seeps.

In the Hot Desert area, typical riparian vegetation consists of shrubs such as willows (*Salix*), salt cedar (*Tamarix*), and arrowweed (*Pluchea*) and seepwillow (*Baccharis*); grasslike plants such as rushes (*Juncas*), and sedges (*Carex*); and aquatics such as watercress (*Nasturtium*) and cattails (*Typha*). Species composition and ground cover vary with the location and abundance of water.

Riparian communities in good condition exhibit an abundant and diverse assortment of plants and animals. Healthy communities show good age distribution; the soil is mostly covered with vegetation; bank

TABLE 2-7

Average Phenological Data for Key Species - Washington County Area

Key Species	Developmental Stages: Start Growth	Flowering	Seed Ripe	Disseminate
Grasses				
Upper Washington County (above 5,000 feet)				
Crested Wheatgrass (Agcr)	3/1	5/1	6/1	6/15
Pubescent Wheatgrass (Agtr)	3/1	5/1	6/1	6/15
Muttongrass (Pofe)	3/20	5/15	6/15	7/1
Squirreltail (Sihy)	3/1	6/1	6/30	7/1
Lower Washington County (less than 5,000 feet)				
Galleta (Hija)	3/15	4/15	6/1	6/15
Big Galleta (Hiri)	3/20	4/20	5/20	6/10
Indian Ricegrass (Orhy)	3/1	4/15	5/1	6/1
Bush Muhly (Mupo)	4/10	5/15	6/1	6/15
Sand Dropseed (Spcr)	3/20	6/1	6/30	7/15
Shrubs				
Upper Washington County (above 5,000 feet)				
Bitterbrush (Putr)	4/20	5/25	6/15	7/1
Lower Washington County (less than 5,000 feet)				
Winterfat (Eula)	3/10	5/1	6/1	6/15
Fourwing Saltbush (Atca)	4/10	4/25	6/11	9/30
Mormon tea (Epne)	3/1	4/1	6/1	6/15
Spiny Hopsage (Grsp)	2/20	4/15	5/25	6/10
Desert Bitterbrush (Pugl)	4/10	5/1	6/1	7/1

TABLE 2-8

Vegetative Types

Vegetative Broad Type	Acres	Percent of Total Acres	Elevation (feet)	Annual Precip-itation (inches)	Soil	Major Plant Species: Common Name	Major Plant Species: Botanical Name	Major Uses
Desert Shrub	175,986	33.2	3,000 to 5,000	8 to 12	Fine to coarse, stony, shallow to deep	Blackbrush Bursage Cliffrose Mormon Tea	Coleogyne ramosissima Franseria dumosa Cowania stansburiana Ephedra spp.	Livestock Grazing, Wildlife Habitat Aesthetics
Pinyon-juniper	93,681	18.0	4,500 and up	10 and up	Gravelly sandy loam, shallow to deep	Blackbrush Mtn. Mahogany Bitterbrush Cliffrose	.... Cercocapus montanus Purshia tridentata	Livestock Grazing Wildlife Habitat Aesthetics
Sagebrush	33,645	6.0	3,000 to 5,000	8 to 16	Fine to coarse sandy loam, shallow to deep	Big Sage Sand Sage Blackbrush Mormon Tea	Artemisia tridentata Artemisia filifolia	Livestock Grazing Wildlife Habitat, Aesthetics
Joshua Tree	40,231	8.0	2,500 to 3,500	8 to 10	Gravelly sandy loam, shallow to moderate	Creosote Bush Blackbrush Range Ratany Bursage	Larrea tridentata .... Krameria parvifolia	Livestock Grazing, Desert Tortoise, Desert Night Lizard, and other wildlife Habitat
Creosote Bush	12,105	2.0	2,500 to 4,000	8 to 10	Fine to moderate sandy loam, shallow to deep	Creosote Bush Range Ratany Bursage Wolfberry	.... Lycium spp.	Livestock Grazing, Wildlife Habitat, Aesthetics
Grass	23,254	4.0	4,000 to 5,000	10 and up	Stony sandy loam to sandy loam, shallow to deep	Crested Wheat Blue Grama Galleta	Agropyron desertorum Bouteloua gracilis Hilaria jamesii	Livestock Grazing, Wildlife Habitat Aesthetics
Half Shrub	14,059	3.0	3,000 to 5,000	8 to 12	Fine and coarse silty loam, shallow to deep	Snake Weed Rabbitbrush Blackbrush	Gutierrezia sarothrae Chrysothamnus spp.	Livestock Grazing, Wildlife Habitat Aesthetics
Saltbush	3,823	0.7	3,000 to 4,500	8 to 12	Fine to coarse sandy loam, shallow to deep	Shadscale 4-Wing Saltbrush Mormon Tea Spiny Hop Sage	Atriplex confertifolia Atriplex canescens .... Grayia spinosa	Livestock Grazing Wildlife Habitat, Aesthetics
Annuals	2,207	0.4	4,000 to 5,000	8 to 12	Sandy loam, shallow to moderate	Cheatgrass Russian Thistle Foxtail brome	Bromus tectorum Salsola kali Bromus rubens	Livestock Grazing Wildlife Habitat, Aesthetics
Waste	130,573	24.7	....	....	....	Juniper Blackbrush	Juniperus osteosperma	Wildlife Habitat, Aesthetics
TOTAL	529,564	100.0						

erosion is generally lacking; the abundant vegetation provides cover for animals and shades the water during most of the day. Figure 2-6 (fold-out bound in the back of this volume) shows the location of riparian vegetative communities.

Livestock and wildlife use these streams and water bodies for watering places, cover, and forage. The riparian vegetation along the banks is in poor condition in areas where use is concentrated and where vegetation begins growth earlier in the spring and continues growth later into the fall than most upland range plants. During this time, the plants are more palatable than dried range plants and are actively sought by cattle (Platts and Rountree, 1972).

Vegetative Condition. The condition of the vegetation is described in terms of its value as livestock forage and its relationship to ecological climax condition. Both comparisons will be discussed separately.

Livestock Forage Condition. Livestock forage condition is the present system used by BLM to rate vegetation as good, fair, or poor in relation to its ability to provide desirable livestock forage. This is based on parameters of the vegetation and soil. The system assesses the quality of vegetation based on the composition of desirable, intermediate, and least desirable species for each class of livestock and considers the current and recent past evidence of soil erosion.

Information was gathered from studies conducted during 1976, and is summarized in Appendix VIII. Of the public land allocated for livestock grazing, 26,150 acres (4.9 percent) are in good livestock forage condition, 140,653 acres (26.5 percent) are in fair livestock forage condition, 232,188 acres (43.7 percent) are in poor condition and 130,573 acres (24.9 percent) were unallocated (Chapter 1).

Ecological Vegetative Condition. The following information has been extracted from the National Range Handbook, 1976, published by the Soil Conservation Service:

> The range condition of areas within a range site is determined by comparing the present plant community with that of the climax plant community, as indicated by the range condition guide for the site.

This evaluation is basically an ecological rating of the plant community. Air-dry weight is the unit of measure used in comparing the composition and production of the present plant community with that of the climax community.

The rating will be between 0 and 100, depending on how closely the plant community resembles the climax plant community for the range site.

Four classes are used to express the degree to which the composition of the present plant community reflects that of the climax. They are:

Range condition class	Percentage of present plant community that is climax for the range site
Excellent	76-100
Good	51-75
Fair	26-50
Poor	0-25

From information obtained from the Soil Conservation Service, Soil Survey of Washington County, 1973 (summarized in Appendix IX), the condition of public land was interpreted as follows:

4,433 acres public land (1 percent) in excellent condition

19,811 acres public land (7 percent) in good condition

58,267 acres public land (20 percent) in fair condition

123,719 acres public land (42 percent) in poor condition

91,681 acres public land (30 percent) no information (includes areas where no interpretation was made)

231,653 acres classified as not a range site

Apparent Trend. Trend is a measurement to determine if the vegetative condition is improving or declining. This can be accomplished by several methods but must include measurements at different points in time, sufficiently separated to allow vegetation change. Photo plot study information was gathered from BLM Cedar City District files where available. Because of lack of time for sufficient replication in most allotments (repetition of experiments under controlled conditions so that a specific result may be observed), available data can only reflect trend as "apparent." Apparent trend observations consider the vigor of

desirable forage species, the quantity of new seedlings established by desirable forage species, the apparent movement of surface litter, and the degree of erosion apparent as viewed in terms of gully formation. Observations also indicated the condition of livestock forage. As shown in Appendix VIII, allotments listed as having apparent trends are shown as "up," "down" or "static." On allotments where no trend information is available, Appendix VIII indicates NA. This information shows 35,468 acres of public land in upward trend, 261,435 acres of public land in downward trend, 73,828 acres of public land in static trend, and 158,833 acres of public land with no information available.

Production. Vegetative production is commonly measured in total pounds of herbage produced per acre. Since information is not available in this form for the Hot Desert area, production is measured in terms of animal unit months (AUMs).

The ocular reconnaissance survey method used determines forage production on the basis of the quality and quantity of forage available to livestock and wildlife. From the older forage surveys, updates made in 1976, and the new surveys completed during 1975 to 1976, the production of vegetation on public land for wildlife is 17,801 AUMs and 19,759 AUMs for livestock. Appendix VIII contains production by allotment. Since wildlife have the ability to graze on steeper slopes than livestock, the wildlife can utilize much of the vegetation in the unsuitable areas. Appendix X contains a detailed description of survey methods.

Threatened and Endangered Vegetation. A survey consisting of a literature search and field investigation by a qualified botanist identified three plant species within proposed allotments that have been proposed as threatened and endangered (Federal Register, June 1976). This survey revealed two other species on the proposed threatened and endangered list in Washington County but not within or immediately adjacent to proposed allotments. The list of the species and their location can be found in figure 2-6 (foldout) and as follows.

Arctomecon humilis. This species has been found on the White Dome and Curly Hollow Allotments.

Astragalus _striatifloris_. This species has not been found on any proposed allotment, but has been found in Washington County.

Echinocereus _engelmannii_ var _purpureus_. This species has been found on the Alger Hollow and Curly Hollow Allotments.

Hetrotheca _jonseii_. This species has not been found on any proposed allotment, but has been found in Washington County.

Pediocactus _sileri_. This species has been found on the Warner Ridge Allotment.

Figure 2-6 indicates locations of those three threatened and endangered plants known to occur within existing grazing allotments administered by the BLM in Washington County.

Poisonous Plants. No serious problem has been reported involving poisonous plants and livestock although there are several such plants scattered throughout the county. Following is a list of known poisonous plants:

Botanical Names	_Common Names_
Delphinium spp.	Larkspur
Lupinus spp.	Lupine
Astragalus spp.	Milkvetch (loco weed)
Quercus _gambelii_	Gambel Oak
Halogeton _glomeratus_	Halogeton
Asclepias sp.	Milkweed
Oxytenia _acerosa_	Copper Weed
Bailyea spp.	Desert Marigold
Stanleya _pinnata_	Princess Plume
Zygadenus spp.	Death Camas

Figures 2-7, 2-8, 2-9, 2-10, 2-11, and 2-12 illustrates various common vegetative types found in the Hot Desert area.

Desert Shrub – Blackbrush Dominant Species

Typical Pinyon – Juniper: Rough Rocky Areas

Figure 2-7
VEGETATIVE TYPES

Sagebrush — Big Sagebrush Dominant Species
Common in Alluvial Bottoms

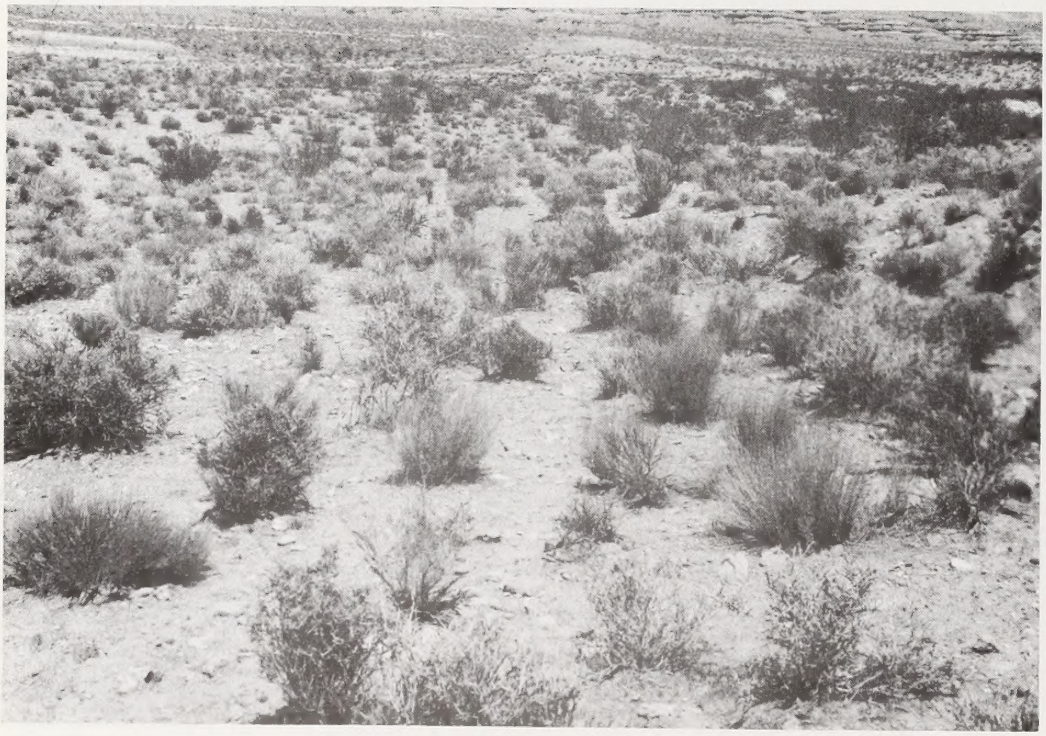
Joshua Tree: Note Sparse Vegetative Cover
And Rocky Soil Surface

Figure 2-8
VEGETATIVE TYPES

Grass — Native Galleta Grass

Creosote Bush—Abundant Annuals And Snakeweed

Figure 2-9
VEGETATIVE TYPES



Half Shrub-Large Open Spaces And
Few Perennial Grasses

Saltbush-Large Open Spaces: Crusty (Gypsum) Soils

Figure 2-10
VEGETATIVE TYPES

Annuals – Closeup

Annuals: Lighter Areas in Distant View – Result of Fire

Figure 2-11
VEGETATIVE TYPES

Riparian

Riparian

Figure 2-12
VEGETATIVE TYPES

WILDLIFE

Introduction. Each of the vegetative types found in the Hot Desert provides food and cover for a variety of animal species. Some animals are associated with a particular plant community or vegetative type, while others are more wide-ranging.

Each animal has its specific food preferences and normally eats certain plants that are seldom used by other animals. Also, certain plants are more palatable, more abundant, more nutritious, or more available to different animals at different seasons. However, in some cases, the same plants may be preferred by more than one animal, including livestock. In such cases, competition may be high, depending on how important that plant is in each animal's diet.

Some wildlife species, such as mule deer and Gambel's quail, are more likely to compete with livestock for food and/or cover and, therefore, will be discussed in detail. Other species, such as cougar and band-tailed pigeon, while still integral parts of the Hot Desert community, will not be considered to any extent since they would not be significantly impacted by the proposed action. A complete species list for the Hot Desert, including mammals, birds, reptiles and amphibians, is available in the BLM Cedar City District Office.

Mammals

Mule Deer. Mule Deer (*Odocoileus hemionus*) are the only big game animals within the ES area that would be affected by the proposed action. Much of their winter range is on public land with the majority of the deer summering in higher country on National Forest lands (fig. 2-13). There are a few small scattered resident herds, however, on BLM administered land. The pinyon-juniper and mixed shrub types are the vegetative types most used by deer, with seedings also receiving heavy use in some areas. There are some specific areas that receive concentrated heavy deer use and some areas that receive heavy deer and livestock use. These will be discussed in greater detail later. Figure 2-14 (foldout) shows mule deer distribution in the Hot Desert. Appendix XI shows

Typical Deer Winter Range

Figure 2-13
WILDLIFE

wildlife AUMs, season of use by allotment, and present condition of deer habitat.

Deer numbers are low throughout the State and Utah Herd Units 58, 61-A, 61-B and 61-C, parts of which cover the concerned area, are no exception. According to the Utah Division of Wildlife Resources (DWR) (Floyd Coles 1976: personal communication), one limiting factor for the deer herds in the southwestern part of the State is not lack of winter range but lack of good summer range in the higher country.

The DWR is managing these herd units to reach the potential population shown below (Utah DWR 1977: personal communication):

Unit	Number in Hot Desert Area
58	2,500 to 3,000
61 A	500 to 750
61 B	2,000 to 2,500
61 C	2,500 to 3,000

On the west side of the Virgin River Planning Unit, there is sufficient browse on the winter range to support the potential herds, and winters in this area are not severe enough to warrant classifying any winter range as "critical." On the east side of the planning unit where winters are more severe, winter range must also support migrating deer from Zion National Park, Cedar Mountain, and Kolob Mountain. As a result of the cumulative demand on forage in these areas by the resident and migrating herds, competition with livestock for browse is more severe (Floyd Coles 1976: personal communication).

Yearly data from DWR deer transects give an indication of pressure on key areas. Figure 2-14 (foldout) shows the locations of these pellet group transects for the Hot Desert, and Appendix XII gives the deer days use per acre for each transect for the past 10 years. When taken alone, these data must be considered with caution. For example, a high deer days use per acre could either mean a high deer density or a severe winter which would tend to concentrate a small number of deer. These figures cannot be applied to an entire area, nor can they be interpreted in terms of exact numbers of deer. They do, however, show a trend over

a length of time when combined with other population data collected by DWR each year (browse studies, winter kill statistics, etc). Also, the data from transects on summer range can give an indication of pressure on winter range.

In an effort to get an even better idea of mule deer use in specific areas, browse transects were run by BLM personnel in the spring and summer of 1976. These are also shown on figure 2-14. Appendix XIII summarizes the information from these transects.

The area of greatest conflict with livestock is in competition for browse during the fall and winter, and forbs and grass in the spring (Smith and Doell, 1968; Muchmore, 1969). Most of the allotments presently have fall, winter, and spring cattle use, which overlaps the period when deer are in the area. Since low precipitation often prohibits fall grass growth, the cattle consume a considerable amount of browse. However, in areas that sustain livestock, deer, and small mammal use concurrently, it is difficult to attribute a percentage of utilization to each species. The browse plants most likely to be involved in deer-livestock competition are bitterbrush (*Purshia spp*.), deerbrush (*Ceanothus sp*.), big sage (*Artemesia tridentata*), cliffrose (*Cowania* spp.), and four-wing saltbush (*Atriplex canescens*) (BLM Range Inventory Studies, 1976).

Forbs are important in deer diets, especially in spring and summer (Kufeld et al., 1973). When cattle stay on public land through spring in many areas, they selectively prefer early green-up of forbs and utilize them heavily. This conflict is more important to the small resident herds on public land than to those deer that only winter in the area, since the resident deer have to depend on the forbs remaining after the cattle move off. However, the wintering deer still utilize the early forbs before they move to summer range.

The allotments on the west side of the Virgin River Planning Unit that are most important to deer in terms of fall, winter, and/or spring range (Floyd Coles 1976: personal communication) are:

Cougar Canyon	Minera Wash
Big Mountain	Wide Canyon
Dagget Flat	Sand Wash
Bull Mountain	Diamond Valley
Desert Inn	Gunlock
Jackson Wash	Twin Peaks

According to DWR, deer stay on most of these areas at least 6 months and on a few, such as Dagget Flat, for as long as 8 months. Although deer numbers are now lower than they were a decade ago, Herd Unit 61-C is thought to be increasing and between 2,000 and 2,500 head now winter in the area of these allotments. Some winter use in the western portion of the planning unit is suspected from deer that are resident in Nevada.

There are several allotments on the east side of the planning unit that are important as deer winter range. The following are critical to Herd Unit 58 (DWR 1977):

LaVerkin Creek	Lamoreaux
Smith and Hurricane Mesas	Red Butte
Toquerville	Coal Pits
Rock Spring	Virgin
Black Canyon	Dalton Wash
Mountain Dell	North Grafton

The allotments in the vicinity of Zion National Park and Kolob Mountain receive particularly heavy winter deer use. Most of these deer tend to remain in the park during the hunting season, and therefore, are not subject to harvest. The dryland wheat farms on Hurricane and Smith Mesas furnish substantial winter forage for the deer, but they also use public land for cover and browsing, as evidenced by BLM transects run in these areas. The major browse species (cliffrose and bitterbrush) receive heavy use and are generally in poor vigor.

The Pintura seeding, which has had no livestock grazing for several years, shows extremely heavy fall, winter, and spring use by deer (Appendix XI). There is a high density of pellet groups, a mown appearance to the grass and severe hedging of many browse plants.

The northeast portion of the Virgin Allotment and the northern portion of the Red Cliffs Allotment are both important deer wintering areas (Floyd Coles 1976: personal communication). Red Cliffs borders the Dixie National Forest where the deer summer. The private fields near Leeds and the Virgin Allotment draw the deer down into the area during the winter and spring.

In addition to the migrant deer herds in Washington County, there are several small resident populations. Little Creek Mountain, Hurricane Fault and Short Creek Allotments together support approximately 75 to 100 head of deer yearlong (DWR 1977: personal communication). There is no evidence of competition for browse between deer and cattle on these allotments. Desert bitterbrush (*Purshia glandulosa*), which is scattered over Little Creek Mountain, shows very little use.

There are about 100 to 150 deer inhabiting the Gooseberry and Grafton areas where there appears to be adequate food and cover (DWR 1977: personal communication). Santa Clara Creek, Land Hill, Boomer Hill, Curly Hollow and Apex Slope Allotments also support a total of 50 to 75 deer. Although the exact number is unknown, a small population of deer is located on the Beaver Dam Slope including Welcome Spring, Snow's Ranch, Bulldog Canyon and Cedar Wash areas. Deer also inhabit the entire length of the Virgin River and the Santa Clara River, but numbers are small, not believed to exceed 20 head in any one group, or 100 total.

Bighorn Sheep. Two areas in the Virgin River Planning Unit have been identified as suitable bighorn sheep habitat (fig. 2-15 foldout) and DWR has agreed with BLM to transplant bighorns into these areas as soon as sufficient stock is available, probably in 4 or 5 years. The exact number has not yet been determined; it will depend on the surplus available from Zion National Park.

Red Mountain presently has no livestock grazing, and the northern Beaver Dam Mountains are too rough and steep for livestock use. The present forage condition in these two areas appears to be good.

Other Mammals. There are numerous other species of mammals inhabiting the Hot Desert area. Some of these are generally associated with the various soil and vegetative types. Others like rodents, jackrabbits and cottontails are common throughout the area, occurring in most vegetative types at some time during the year.

The Beaver Dam Mountains are an effective barrier to many small mammals. For this reason, species occur here that are not found elsewhere in Utah, as is the case for some reptiles. This mountain range also represents the dividing line between the Colorado Plateau and the Basin and Range Provinces. Several local races of small mammals are found in the St. George Basin, which differ from those found on the west slope of the Beaver Dam Mountains.

Carnivores, such as coyotes, foxes, skunks, and cougars are more mobile and, therefore, are not directly dependent on either soil or vegetation.

Riparian zones are extremely important to desert wildlife, including deer, predators, small mammals, and birds. In general, riparian habitats can be expected to have higher productivity of all species, both vertebrates and invertebrates. Herbaceous plants associated with riparian communities are a valuable source of food. Woody plants provide cover and nest sites and reduce water temperatures, making these areas important to mammals, birds, reptiles and amphibians. Water, which is limited in the Hot Desert, is also available to wildlife in these zones. Where riparian areas are heavily grazed and in poor condition, the remaining cover and food for wildlife are still greater than that in much of the surrounding area. Figure 2-6 (foldout) shows the location of these important areas.

Game Birds

Gambel's Quail. The most important game bird in the Hot Desert area in terms of hunter days and hunter dollars is the Gambel's quail (*Lophortyx gambelii*). The birds are found in a variety of habitats, from pinyon-juniper to creosote-bursage communities, but almost always in association with abundant cover along large dry washes. The mixed

shrub vegetative type is the most heavily used by the quail, but large washes in other types, except dense pinyon-juniper, produce some quail. Desert almond (Prunus fasciculatus) is the preferred cover species. It occurs along the margins of the larger washes and may influence quail abundance and distribution in southwestern Utah (Nish, 1964). Figure 2-15 (foldout) shows general quail distribution in the Hot Desert area. Riparian areas, particularly along the Virgin River, Santa Clara Creek, Leed's Creek, Quail Creek, Beaver Dam Wash, and Ash Creek are especially important to the quail. Appendix XI shows present quail habitat condition.

The east and west slopes of the Beaver Dam Mountains were the site of an intensive quail study by Nish (1964). Quail numbers each year appear to be a result of precipitation since this influences the yearly supply of succulent green vegetation upon which the birds depend. Over half (53.3 percent) of the total volume of crops analyzed in the Nish study contained succulent foods while seeds represented the next most utilized food (40 percent). Filaree (Erodium cicutarium) and dwarf milkvetch (Astragalus nuttallianus) were the most important foods in terms of volume, with spurge (Euphorbia albomarginata), desert almond, Cryptantha sp., and desert willow (Chilopsis linearis) contributing lesser amounts to the quail diet.

The presence of water influences quail density, but it is not positive whether this is a result of concentration or actual increased abundance. It seems probable that quail could be lured into presumed suitable areas not presently occupied by quail. Also, better utilization of presently occupied areas could conceivably be accomplished by proper distribution of water. The effect of water development is relatively insignificant though, as far as maintaining good hunting is concerned (Nish, 1964).

Mourning dove. Mourning doves (Zenaida macroura) occur throughout the Hot Desert area, except in dense pinyon-juniper stands. Food is seldom a limiting factor to dove numbers because they are mobile and can utilize a wide variety of seeds (BLM Manual, 1970). They are, however,

more abundant in wetter years when the crop of annuals is better. This is due to better production and a shift in concentration.

In arid areas such as the Hot Desert, water determines the distribution of doves. Doves will use practically any source of water but prefer shallow edges of ponds and streams which are free of vegetation. For this reason, doves make heavy use of guzzlers, bird ramps, and similar devices which make the water more accessible (BLM Manual 6-22, 1970).

Waterfowl. The Virgin River is an especially important area for waterfowl during migration and in the winter, but there are also a few birds that breed along the river and are yearlong residents. Almost all of the river bottom lands are not BLM-administered and, therefore, not affected by BLM grazing procedures. The same applies to Gunlock and Baker Reservoirs, which also receive considerable use by waterfowl, but very little shoreline is controlled by BLM.

There is some migratory and summer use made of stock ponds and impoundments throughout the Hot Desert area. Little Creek Mountain has several such ponds where waterfowl can often be observed during the spring, summer, and fall, and there have been a few broods reared on these ponds. The shorelines, however, are practically devoid of any vegetation due to heavy cattle grazing and trampling in the winter months and cover for waterfowl is limited. Cattle tend to concentrate close to the ponds, especially in the spring when it warms up, and consequently vegetation cannot become established until the pasture is rested.

There are also some impoundments along the upper Beaver Dam Wash, both on private and public lands, which are used by waterfowl. These areas do not receive heavy cattle use and the bank vegetation has become better established.

Nongame Birds and Raptors. There are 257 kinds of birds, representing three different biomes and all seasonal categories and degrees of abundance, known to occur in the Hot Desert region. This area is the northern limit of several species, 15 of which are found nowhere else in

Utah. These include the Black Hawk, Gilded Flicker, Vermillion Flycatcher, Hooded Oriole, and others (Behle, 1976).

Riparian areas are important to nongame birds and raptors, not only from a food and cover standpoint, but also for nest sites. Some raptors utilize the larger trees for this purpose and the smaller birds use the lower shrubs and grasses for cover while nesting on the ground.

Reptiles. Besides being the extreme northeastern limit of the desert tortoise, the southwestern corner of Washington County is also the habitat of a number of other endemic reptiles, some of which occur only in this southwestern corner of the State. These include the desert night lizard, the Mojave rattlesnake, the southwestern speckled rattlesnake, the sidewinder, the desert glossy snake, the western blind snake, the gila monster, the desert iguana, and the banded gecko. The Beaver Dam Mountains, particularly the west slope, are considered critical in the distribution of these reptiles in Utah (Barnum, 1972 and Coombs, 1977).

Other species, such as the Sonora lyre snake, the western ground snake, the western patch-nosed snake, the zebra-tailed lizard, and the chuckwalla are confined in Utah to the extreme southern portion of the State. Under criteria set forth in the BLM Manual 6840, these species could be listed as sensitive.

Desert Tortoise. The Beaver Dam Slope area represents the extreme northeastern limit of the desert tortoise, *Gopherus agassizii* (fig. 2-15 foldout). Small disjunct populations, believed to be released captives, inhabit three areas north of St. George, but the Beaver Dam Mountains have formed an effective barrier to the normal northward range of the tortoise (fig. 2-16). The tortoise range extends into southern Nevada, southern California, Arizona and Mexico. The status of the desert tortoise has not been as firmly established in these other states as it has been for the rapidly declining Utah population, which received protection status in 1971. However, California, Nevada, and Arizona now recognize the tortoise as a protected species.

Desert Tortoise

Figure 2-16
WILDLIFE

The first comprehensive study of the tortoise in the Beaver Dam Slope area was conducted by Woodbury and Hardy during the 1930s and early 1940s; results were published in 1948. Some tortoises marked in that study are still living in the same area. This is the oldest marked population of tortoises, and possibly the oldest marked population of vertebrates in the United States. This fact gives this population considerable scientific significance.

The most significant findings from Woodbury and Hardy (1948), insofar as the proposed action is concerned, covered the vegetative composition of the area and the food habits of the tortoise, both of which show differences from the present situation. In looking at the Woodbury-Hardy vegetative information, a decrease in many of the desirable species is apparent. For example, bush muhly, Muhlenbergia porteri, was referred to as being "common", and it was also noted that "Indian ricegrass, Oryzopsis hymenoides, is common in certain small areas." In the spring of 1976, Dr. Ross Hardy returned to the tortoise area with BLM biologists, and remarked that he "could easily see the decline of muhly since the 1940s."

In another study by Hardy (1945), vegetative transects in this area placed winterfat, Eurotia lanata, as the second most abundant shrub, at a density of 545 plants per acre. Brigham tea (Ephedra nevadensis) was next with 254 plants per acre.

A range survey conducted by BLM in the early 1960s (ocular reconnaissance method) and verified in 1976 showed only a trace of Indian ricegrass, and bush muhly only made up about 1 percent of the composition in all transects except one, where it was 8 percent. This 8 percent of bush muhly was in a steep canyon with productive soils and more inaccessible to cattle, which might explain its greater abundance.

Also, Ephedra nevadensis was only 1 to 2 percent of the composition, except for the same steep canyon transect where it was 5 percent. The same is true for Eurotia lanata, which was 5 percent on one transect, but only a trace or 1 percent on the others.

The results of this survey were rechecked in 1976 by BLM during AMP preparation and found to be comparable with the original survey. Although the methods and intensities of inventory used by Hardy and BLM are not the same, the two provide a comparison which generally indicates a decrease in the relative abundance of these species since Hardy's time.

Historically, heavy sheep use in the spring and cattle use in the winter have contributed to the decrease in desirable forage species. Woodbury and Hardy (1948) reported that the annual plant cover would frequently be denuded by grazing and trampling, and often almost the only annuals and grasses remaining would be those growing about the base of and up through the perennial shrubs and cacti. Sheep only use the area to trail through, but during that short period, they make a significant impact on the vegetation by trampling and foraging. Coombs (Eric Coombs 1976: personal communication), feels this is detrimental to the tortoise. Cattle also make heavy use of the annuals in the spring; this heavy use results in competition with the tortoise. In drier years when annuals are less abundant, this competition becomes more pronounced.

The following is an excerpt from the Woodbury-Hardy study (1948):

> The lush carpet of annuals that usually fills up the spaces between the bushes in early spring and sometimes in fall offer a great variety of green succulent vegetation, probably rich in vitamins, when it is available. It is normally limited to a 30- to 40-day period in spring and in fall but when the sheep herds sweep the carpet clean the tortoise access to the fresh green vegetation is limited to a few days.
>
> The mesquite grass which grows up through many of the bushes and which the sheep do not decimate seems to be the chief source of food for the tortoises. Being protected by the bushes and not particularly palatable to sheep, it grows up and dries in place and often persists during the drouth periods.

(Explanatory note: The mesquite grass referred to above by Woodbury and Hardy is now known as bush muhly, or Muhlenbergia porteri.)

Through direct observation and fecal analysis, Coombs (1977) determined that the chief foods of the tortoise diet are filaree, Erodium cicutarium, and red brome, Bromus rubens. Coombs also indicates by direct observation that bush muhly is still the most preferred species in terms of availability and relative occurrence in the diet. The percentage of availability of bush muhly is so low that the tortoises do not encounter it often enough for it to be a major food item. In contrast, red brome, to which Coombs assigns a very low preference makes up the second highest percentage of the diet. Obviously, the animals have had to adapt their food habits to what is now available in order to survive (Woodbury and Hardy, 1948). Appendix XI shows the present condition of tortoise habitat in the Hot Desert.

Some ecologists have suggested that the tortoise needs native plants for adequate nutrition and often claim that exotic and/or annual plants are inferior foods (Hansen et al., 1976). In Hansen's study foxtail brome and filaree, exotic annuals, made up 85 percent of the diets of Utah tortoises. This is compared to two other areas, Grand Wash Cliffs above Lake Mead, and the New Water Mountains in Arizona, where perennial grasses and grasslikes made up 31 percent and 80 percent of the tortoise diets, respectively. Both of these areas are not used for livestock grazing.

Fecal analysis indicates a high degree of dietary overlap between tortoises and cattle in the Beaver Dam Slope (BLM, 1976). The major annuals on the slope, Bromus and Erodium, constitute a very similar percentage of each animal's diet in three different study areas (table 2-9). These data were interpreted from one collection of samples that represent various seasons. The Beaver Dam Well area, where, according to this analysis, tortoises have the most diverse diet and least dietary overlap with cattle, is also the area of greatest tortoise reproduction on the slope (Coombs, 1977).

The most important time for the tortoises in terms of nutrition is the spring. They are returning from months of winter hibernation during which they utilized stored fat, and they need the new green vegetation

TABLE 2-9

Percent of Bromus and Erodium in Diets and Diet Similarity

Study Area	Cattle	Tortoise	Diet Similarity (% of Overlap)
Woodbury-Hardy	42.53	52.79	40.6
Welcome Wash	48.90	50.97	38.5
Beaver Dam Well	31.84	33.29	33.9

Source: Bureau of Land Management, 1976. Fecal Analysis Data. Extracted from study prepared by Colorado State University. Cedar City District Office, Cedar City, Utah.

to replace these reserves. Annuals are important because they are usually the first vegetation to greenup in the spring (Coombs, 1976). Perennial grasses such as bush muhly are important to the tortoises for several reasons (Coombs, 1977). They remain succulent longer so they are still available after the annuals dry up. Late spring rains are more likely to cause a response in perennials, not possible to early maturing annuals. There is little opportunity for the tortoise to drink water and it must depend upon the water obtained in its food to supply its needs. The supply comes mainly from the succulent vegetation in spring and fall, which is also the chief source of food from which fat is stored for hibernation (Woodbury and Hardy, 1948). Unless these supplies are adequate, the tortoises will enter hibernation in a weakened condition; a dry spring the following year will greatly reduce their chances for survival through the summer.

Availability of the plant species must also be considered. The grasses, particularly bush muhly, may be more abundant in places such as steep slopes or rocky hillsides, but it is not likely that tortoises will utilize them because of their low mobility. Also, in those places

where bush muhly has been grazed to the point that it is only found in the very centers of shrubs, it can be considered mainly unavailable to the tortoises.

Tortoises possess home ranges that they frequent on a regular basis for several years or seasons. The size depends on the sex and age of the animal, with the females and small individuals having the smallest home ranges and the large males having the largest. The size varies anywhere from under 1 acre for very small tortoises up to 1 square mile or more. Large male tortoises may also defend territories, although insufficient data exists to prove this (Kristin Berry 1976: personal communication).

There were an estimated 2,000 tortoises on the Beaver Dam Slope in the 1940s (Coombs, 1974). According to Hardy (1976), there was a theoretical population of 318 tortoises within a 1,200-acre study area alone, or about 150 tortoises per square mile. Present population levels are thought to be at an all-time low with only 350 native animals and 68 feral captives remaining in the entire 50-square mile Beaver Dam Slope area (Eric Coombs 1977).

Approximately 150 tortoises inhabit the Paradise Canyon area north of St. George (fig. 2-15 foldout). This is essentially an ungrazed box canyon. This tortoise population has an estimated 28 percent young and shows good reproduction and a healthy adult sex ratio, in extreme contrast to the native population.

The two other areas that support tortoises, thought to be released captives, are ungrazed Snow Canyon State Park, where a few have been sighted, and a 5-square mile area north of St. George where an estimated 100 to 200 tortoises live. This latter population also shows good reproduction (Coombs, 1976).

There have been numerous reasons offered for the decline of the tortoise in the Beaver Dam area. Overcollection by tourists and commercial establishments, predation, and habitat deterioration through grazing are the reasons that receive the most attention. Hardy (1976) cites the third reason, along with den destruction and loss of forage,

as continuing problems. Coombs (1977) also includes predation by coyotes and kit foxes as another reason for declining numbers.

One cause of mortality, often mentioned when discussing tortoise conflicts with livestock, is the trampling and crushing of tortoises, especially young ones, by cattle. Although this does undoubtedly occur, the extent has not been determined. The population seems to be at such a low level now that any loss of an individual, whether by predator, human collection, trampling, or whatever, is significant.

To further complicate the problem of such low numbers, Coombs (1977) discovered a complete reversal of the sex ratio found by Woodbury and Hardy. They reported a ratio of 36 percent males and 64 percent females, compared to the 70 percent males and 30 percent females reported by Coombs. This is especially significant since the tortoise is a polygamous species.

One reason for this unusual sex ratio is that females are more vulnerable to collection, since they remain near the dens, which are easily accessible, longer in the spring to lay their eggs (Coombs, 1974). Also, since the females are burdened with egg production, which exhausts their fat reserves in the spring, any lack of forage would have a greater impact on reproducing adult females than on males (Berry, 1976). Competition with livestock for forage therefore could be a cause of differential sex mortality.

According to Coombs (1974), the most serious point to be made concerning the tortoises on the Beaver Dam Slope is that it is a declining population characterized by a majority of older adults and very few young. This varient in age structure cannot be attributed to collection, since collecting would more likely impact the adults who are the more mobile and obvious members of the population. Removal of the larger tortoises would have a depressing effect on the sub-adult and adult-age classes, and favor an age structure different than that now existing in the population (Berry, 1976).

As evidenced by the difference in mortality and reproductive rates determined by Coombs (1977), the present density is too low and there is

not enough reproduction to even maintain the population. While there are no definitive data to determine the relationship between nutrition and reproduction in this particular population, such a relationship has been documented for an ecologically similar species, the chuckwalla (Berry, 1974), and other desert reptiles and amphibians (Brown, 1968, Fitch, 1970). Coombs (1974) has noticed a difference in reproduction between wet and dry years, leading to the assumption that tortoises respond to insufficient forage by reducing or halting reproduction. Kristin Berry (1976: personal communication), states that the amount and availability of winter and spring forage may offer the key to successful reproduction of the tortoise.

Threatened or Endangered Species

Peregrine Falcon. The only terrestrial species, officially listed as threatened or endangered, that occurs in the Hot Desert area is the peregrine falcon (*Falco peregrinus*). It is listed as a "rare permanent resident" by Wauer and Carter (1965) but migrants also occasionally occur. Its probable distribution in Washington County is shown on figure 2-15 (Porter and White, 1973).

At present there is one known active nest in this region but it does not occur on public land; the major hunting area of the falcon is also not within the ES boundaries, although they may occasionally hunt on the subject lands (Henry McCutchen 1976: personal communication).

WATER RESOURCES AND FISHERIES

Introduction. All of the environmental statement (ES) area is within the Virgin River Drainage of the lower Colorado River Basin. The major portion of the headwaters arise in the Pink Cliffs portion of the Markagunt Plateau, with branches from the Paunsaugunt Plateau. Two major forks, the North Fork and East Fork, join in eastern Washington County to form the Virgin River, which travels through Utah, Arizona, and Nevada before emptying into Lake Mead (fig. 2-17 foldout).

Three geological areas contribute to the drainage: the Colorado Plateau, the southern portion of the Great Salt Lake Basin, and the northern extension of the Sonoran Desert. Because of the variation in origin, there is wide fluctuation in the amount and quality of water entering the Virgin River system. Most of the tributaries are intermittent. Flows tend to fluctuate widely, with low flow in late summer and early fall, and highest average flows in April and May. All channels suffer from occasional severe flooding from intense thunderstorms of short duration July through September.

Water Supply. Water comes from precipitation, surface flow, and groundwater. Losses are due to agricultural, domestic, and industrial uses, evaporation, surface, and subsurface outflow. Water supply in the ES area depends upon surface and subsurface flow entering from adjacent areas. Appendix XIV describes the sources of water for the St. George area and the method used for calculating recharge rates, prepared by Cordova et al., (U.S. Geological Survey report, 1972). Similar methods were used to develop estimates for water supply and loss for the ES area as a whole. A summary of miles of drainages in the ES area can be found in table 2-10.

Groundwater. Groundwater comes from consolidated and unconsolidated aquifers. Supply is highly variable in quantity and quality as a result of differences in source. Most of the groundwater recharge is from neighboring areas, with direction of flow into the ES area essentially duplicating the surface flow patterns. Estimates of groundwater recharge for the ES area are:

Supply	Acre-Feet
Precipitation recharge	116,000
Surface-flow infiltration	19,000
Subsurface inflow	27,000
TOTAL	162,000

Surface Water. An estimated total of about 190,000 acre-feet per year enters the ES area as shown in table 2-11. A large part of this surface inflow comes from the Virgin River, Santa Clara River, Ash Creek, and LaVerkin Creek. In addition, 42,786 acre-feet of water per year flow from springs, seeps, and drains, based upon water right applications. This estimate (best available) is probably high since water right applications traditionally reflect an amount in excess of the usable water available. Surface water is diverted for irrigation; however, limited storage capacities and low river flows reduce the ability to utilize much more than 60,000 acre-feet of water per year.

If inflow from both surface and groundwater and all water produced in the ES were available for use, the following water supplies would be available:

Source	Acre-feet
Surface flow	233,456
Subsurface flow	162,000
TOTAL	395,456

Water Utilization. In such an arid climate, water is usually a limiting factor in domestic, industrial, and agricultural development. The demand for water is indicated by the number and volume of water rights on file with the State Engineer's Office in Cedar City. Water allocations total over 560,000 acre-feet in the Virgin River drainage (unpublished data, Southern Utah State College, 1976). Water allocations greatly exceed the average available water supply. All of the ES area is closed to further water application with the exception of a 5,000-acre triangular area formed by the Virgin River, Arizona State line, and the Hurricane Fault and a 5,000-acre area near the Beaver Dam Mountains.

TABLE 2-10

Miles of Fisheries Habitat and Riparian Condition

Allotment	Stream	Drainage Total Miles[a]	Public Stream Miles	Miles of Fish Habitat	Public Land Riparian Condition (miles) Excellent	Good	Fair	Poor
Apex Slope	Virgin River	1.25	.65	1.25	.....	.....	.65	.....
Beaver Dam Slope	Beaver Dam Wash	4.25	3.75	.00	.....	.....	......	3.75
Boomer Hill	Santa Clara River	1.625	1.25	.50	.....	.....	1.25	.....
Bull Mountain	West Fork Beaver Dam Wash	11.00	8.00	11.00	.....	4.00	3.00	1.00
Cougar Canyon	West Fork Beaver Dam Wash	4.25	4.00	2.25	.....	1.00	1.50	1.50
	Sheep Canyon	2.25	2.25	.50	.....	.25	......	2.00
	Pine Park Canyon	2.25	1.00	2.25	.....	.....	1.00	.....
Curly Hollow	Virgin River	2.00	2.00	2.00	.....	.....	2.00	.....
Desert Inn	Beaver Dam Wash	2.00	1.00	.00	.....	.....	......	1.00
	East Fork Beaver Dam Wash	11.75	8.00	2.25	.....	1.00	4.00	3.00
	Big Spring Canyon	1.25	1.25	.00	.....	.....	1.25	.....
	Bull Canyon	2.25	2.25	.25	.....	.25	1.00	1.00
Dome	Virgin River	2.00	1.00	2.00	.....	.....	1.00	.....
Fault and Trail	Virgin River	2.75	.25	2.75	.....	.....	.25	.....
Fort Pierce	Fort Pierce Wash	4.50	3.50	1.00	.....	.....	3.00	.50
Gunlock	Santa Clara River	3.875	2.50	3.875	.....	.50	1.00	1.00
Herd House	Fort Pierce Wash	1.75	.50	.50	.....	.....	......	.50
Hurricane Fault	Gould Wash	6.00	5.25	.00	.....	.....	.75	4.50
Jackson Wash	Beaver Dam Wash	4.00	4.00	.00	.....	.....	......	4.00
Land Hill	Santa Clara River	1.50	1.50	1.00	.....	.....	1.50	.....
LaVerkin Creek	LaVerkin Creek	9.00	6.75	2.25	.....	.....	2.00	.50
Minera Wash	Moody Wash	.50	.50	.50	.....	.....	......	.50

[a]Drainage may not contain water for its total length.

(continued)

TABLE 2-10 (concluded)

Allotment	Stream	Drainage Total Miles[a]	Public Stream Miles	Miles of Fish Habitat	Public Land Riparian Condition (miles) Excellent	Good	Fair	Poor
Mountain Dell	North Creek	1.25	.25	1.25	.....	.....	.25	.....
North Grafton and Grafton	Virgin River	1.25	.625	1.25	.....	.....	.625	.....
Red Cliffs	Virgin River	4.75	1.75	4.75	.....	.....	1.75	.....
	Leeds Creek	7.00	4.00	3.25	.50	.50	3.00	.....
Sand Hills	Virgin River	2.00	1.00	2.00	.....	.....	1.00	.....
Sandstone Mountain	Virgin River	2.875	2.00	2.875	.....	.....	2.00	.....
Santa Clara Creek[b]	Santa Clara River	3.75	1.00	3.50[b]	.....	.....	1.00	.....
Scarecrow Peak	Beaver Dam Wash	11.75	6.50	1.00	.....	.....	......	6.50
Snow Holding Pasture	Magotsu Creek	2.25	.25	2.25	.....	.25	......	.....
Toquerville	LaVerkin Creek	3.25	2.75	3.25	.....	.....	......	2.75
Veyo	Santa Clara River	2.125	1.125	2.125	1.125	.....	......	.....
Virgin	Virgin River	3.75	.50	3.75	.....	.....	.50	.....
	North Creek	3.875	1.00	1.50	.....	.....	......	1.00
White Dome	Fort Pierce Wash	5.25	2.625	5.00	.....	.625	......	2.00
	TOTAL	137.125	86.525	73.875	1.625	8.375	35.275	41.25

[a]Drainage may not contain water for its total length.

[b]Dewatered during summer months.

TABLE 2-11

Surface Flow

Stream	Drainage Area (square miles)	Maximum Flow (ft3/s)[a]	Minimum Flow (ft3/s)[a]	Mean Flow (ft3/s)[a]	Average Annual Flow (acre-feet)	Average Annual Flow (inches)
North Fork Virgin River Near Springdale	350	7,000	20	99.5	72,090	3.775
East Fork Virgin River Near Glendale	74	202	7.2	19.4	14,060	.....
Virgin River At Virgin	934	22,800	40	201	145,600	2.59
Virgin River Near Hurricane	1,530	20,100	41	220	159,400	.....
Virgin River Near St. George	3,820	13,800	.....	......	92,200	0.49
Virgin River At Littlefield, Arizona	5,090	35,200	34	226	163,700	.....
Atkinville Wash	68	5,180	0	......	....	.....
Fort Pierce Wash 3.5 miles southeast St. George	1,650	15,000	0	......	2,000(E)[b]	.....
Leeds Creek Near Leeds	15.5	412	1.1	6.94	5,030	.....
Cottonwood Wash Tributary Leeds Creek	43	6,440	0	......	....	.....
LaVerkin Creek	....	......	.....	......	3,100(E)[b]	.....
Coalpits Wash 1 mile above mouth	20.8	8,350	0	......	....	.....
Ash Creek and LaVerkin Creeks, at mouths	....	......	.....	......	6,473	.....
Ash Creek Near New Harmony	....	......	.....	......	7,560	.....
Ash Creek Near Toquerville	190	275	7.6	35.4	2,561	.....
South Ash Creek Below Mill Creek	11	202	0.64	6.82	4,940	.....
Santa Clara River Near Pine Valley	18.7	397	0.6	9.2	6,670	4.75
Santa Clara River Near Central	97	1,450	1.2	16.9	12,240	2.35
Santa Clara River At Gunlock	280	455	1.1	21.5	15,580	.....
Santa Clara River Above Winsor Dam	338	1,750	0.53	21	15,210	0.9
Santa Clara River Below Winsor Dam	360	489	0	17.35	12,543	.....
Santa Clara River Near Santa Clara	410	1,980	0	20.8	15,070	.....
Santa Clara River Near St. George	502	......	.....	......	24,000	0.9
Moody Wash Near Veyo	33	720	0	2.83	2,050	.....

Source: Adapted from Cordova et al., (USGS, 1972), Utah State Engineer.

[a]ft3/s = cubic foot per second.

[b]Estimate.

Some estimates are available for current water uses. About 60,000 acre-feet are required annually for irrigation of cropland (see Fisheries for related impacts), 30 acre-feet for livestock on Federal land, and about 11,000 acre-feet used for domestic water supply (Utah Division of Water Resources, 1976).

In 1972, BLM personnel estimated current and future water needs on public land (Appendix XV). These estimates indicate about 1,500 acre-feet are needed on public land at the present time, with a projected rise to about 1,600 acre-feet by the year 2000.

Water Quality. Quality of subsurface water depends upon the geologic formation it flows through. Dissolved solids range from about 100 parts per million (ppm) to over 6,000 ppm. The lowest levels of dissolved solids are found in unconsolidated formations, with the highest occurring in water from shales and other formations of marine origin.

Surface water quality reflects the geological formation from which it originates. All surface water quality is modified as the streams flow through the ES area. Much of the change is the result of natural erosion. Because of low vegetative densities, steep gradients and unstable substrates, natural erosion levels are high. Bureau of Reclamation estimates indicate that 1.8 acre-feet of sediments per square mile are contributed to the Virgin River above the town of Virgin; below the town of Virgin, the figure is 1.2 acre-feet per square mile per year. Sediments contributed by erosion also increase salinities and concentrations of metals and trace elements.

One major source of salinities is LaVerkin Springs, located near the town of Hurricane in the Virgin River, which adds over 100,000 tons of dissolved solids per year to the river.

Human activities, particularly irrigation, livestock raising, and domestic use, increase levels of contaminants in the water. Most of these additions are from areas not covered by the allotments. No studies within the ES area are available to indicate the impacts of grazing on public lands on the quality of waters. General water quality studies are available for the ES area, with most of the information recorded from the Virgin and Santa Clara Rivers.

Sediments, dissolved solids, coliform bacteria, cadmium, selenium, iron, and manganese have been commonly found to exceed water quality standards adopted by the State of Utah.

In addition to chemical data, water quality is shown through collections of macroinvertebrates. Because of the length of their lifecycle, macroinvertebrate populations often better express the quality of a stream than does the water quality sample. In a stream with high stress, such as from silts, wide temperature ranges, or pollutants, the number of taxa, (types of organisms) declines, as shown by the diversity index, and the amount of material present (the biomass), declines. For example, the diversity in the Virgin River above LaVerkin Springs is 2.24 and the biomass 52 grams per square meter (g/m^2); below LaVerkin Springs, the values drop to a diversity of 0.72 and a biomass of 0.2 g/m^2. For streams in the ES area, most have low values of biomass and diversity. Diversities range from about 1.5 to 3, and biomass from 0.2 g/m^2 to 20 g/m^2. Lowest values were from the Virgin River below LaVerkin Springs, from Moody Wash, and East Fork Beaver Dam Wash below Goldstrike. Highest diversity values were from the Upper Santa Clara River, North Creek and upper LaVerkin Creek near the Park boundary. These areas are characteristically less disturbed from natural and human activities and have less fluctuation in parameters that affect water quality.

Fisheries. There are no fisheries' surveys that document the condition of fisheries' habitat and populations prior to extensive settlement and development of the Hot Desert ES area. However, Deacon and Minckley (1974) state that the native fauna of rivers in arid regions is generally limited as a result of long periods of variable geologic and climatic conditions that impose extreme variability on the streams themselves. Thus, the native fishes in the ES area (Virgin River drainage) are adapted to widely fluctuating conditions caused by extreme variations in stream discharge and stream sediment loads (Cross, 1975).

According to Cross (1975): "Settlement of the Virgin River Basin by Caucasian man has produced physical, chemical, and biological

alterations that have been more or less deleterious to the native fauna. The effects of these alterations have resulted in the decline and/or disappearance of native populations from many areas within the Virgin River drainage."

Fisheries Habitat. The fisheries' habitat on public lands in the Hot Desert ES area consists of a few small perennial streams. In this arid environment, this habitat is closely related to and directly dependent on condition and vigor of riparian vegetation growing along the stream border (Kennedy 1977). These close relationships are most adequately considered simultaneously.

Figure 2-6 (foldout) shows the streams within the Hot Desert ES area that contain fisheries habitat in some or all of their reaches. Table 2-10 shows the mileage of stream fisheries' habitat and condition of associated riparian vegetation on public lands administered by BLM. Existing conditions range from excellent to poor. However, the majority of the existing habitat is low quality (fair and poor rating) compared to its biological potential.

To form the basis for an impact analysis, some background information on typical habitat characteristics and their interrelationships needs to be briefly discussed.

Streamside riparian vegetation provides soil (bank) stability. Water-seeking roots bind the soil together and the above-ground vegetative growth slows down flood waters, catches eroding silt and provides a concentration of water flows within the stream channel. Slowing of flood waters greatly reduces stream bank erosion, which reduces stream siltation (Otis, 1974).

Overhanging branches and grasses in the water provide natural nesting, feeding, and breeding areas for terrestrial and land-stage aquatic insects that appear in the diet of stream fish. This overhanging vegetation also offers excellent fish hiding places (Otis, 1974). Boussu (1954) and Platts and Rountree (1972) consider the most beneficial characteristics of streamside vegetation to be the cover it furnishes to aquatic organisms, stabilizing stream banks and overhanging shrubs, thereby providing hiding places for fish.

Streamside riparian vegetation also serves to buffer light penetration and water temperatures on small streams (Minckley, 1963). Many studies have shown that extensive removal of riparian cover can seriously increase water temperature (Tebo, 1974). Leaves of streamside plants provide shade during the hot summer period, which reduces light levels and water temperatures. The leaves, twigs, and other organic vegetative material that fall into small streams are a major source of energy to these ecosystems (Hynes, 1970; McConnell, 1968).

Thus, we find in the literature that streams are often energy dependent upon the riparian vegetation and the watershed. Likens and Bormann (1974) have demonstrated the nutrient linkages between streams and watersheds. They state clearly that the key to wise management of aquatic ecosystems is wise management of watershed.

Species and Populations. Seven families and 25 species of fishes have been reported within the Virgin River Basin; of these, 20 species have been found in the ES area (table 2-12). Only 6 of these 20 species are native fishes. The remaining 14 species were introduced either accidently or for sporting or food purposes. Little data are available from the Utah Division of Wildlife Resources on their relative abundance or populations trends within the Hot Desert ES area (Appendix XXV).

Endangered and Potentially Sensitive Species. The woundfin (*Plagopterous argentissimus*), officially listed by the U.S. Fish and Wildlife Service as endangered, is known to occur in the Virgin River from La-Verkin Springs, Utah downstream to Lake Mead, Nevada and in the lower portions of LaVerkin Creek (Cross, 1975). A recovery team, formed by the U.S. Fish and Wildlife Service, has prepared a draft recovery plan, which contains proposed management recommendations for the woundfin. Under this plan, there would be a prohibition on modification of designated critical habitat and a plan for monitoring of habitat and population levels. In addition, the plan contains a recommendation to maximize Federal ownership of habitat lands. Additional information on the woundfin can be found in the Vaughn Hansen report by Winget, Bauman, and Deacon, 1977.

Three fishes could have the potential to be considered as sensitive, according to criteria set forth in BLM Manual 6840. The first species, Virgin River roundtail chub (*Gila robusta seminuda*) is being proposed by the U.S. Fish and Wildlife Service for listing as an endangered species. This species has declined the most severely of any native species in the Virgin River system. It is found in the Virgin River from Littlefield, Arizona to LaVerkin Springs (Cross, 1975).

The second species, Virgin River spinedace (*Lepidomeda mollispinis mollispinis*), is included by the State of Utah in its list of fishes that are protected from harvest. The spinedace is found in the mainstream of the Virgin River, lower drainage of Leeds Creek, Ash Creek, North and East Forks of the Virgin River, upper Santa Clara drainage, East Fork of Beaver Dam Wash, in the West Fork of Beaver Dam Wash near the State line, and in the mouth of the Beaver Dam Wash (Cross, 1975; Armantrout, 1977).

The third fish, Utah cutthroat trout (*Salmo clarki utah*), is being studied by State and Federal agencies and the scientific community for protection. Although this species is thought to have been introduced into the Santa Clara River in the mid-1800s, no record of this species has been found recently within the Hot Desert area. Therefore, this species will not be discussed further in this statement.

There are two snails found in the Hot Desert region which are proposed for Federal listing as threatened and/or endangered. The snails are the St. George snail (*Amnicola deserta* - *Fontelicella deserta*), and the Zion snail (*Physa zionis*). A new species of *Fontelicella*, closely related to the St. George snail, has also recently been discovered. No impacts from the proposed action are anticipated, so these will not be discussed further in the ES.

TABLE 2-12

List of Species and Their Classification Status in the Hot Desert ES Area

Species	Native Species	Introduced (Exctic) Species	Nongame Species	Game Species	Endangered Species	Sensitive Species
Rainbow trout, Salmo gairdneri	...	X	...	X	...	...
Brook trout, Salvelinus fontinalis	...	X	...	X	...	...
Brown trout Salmo trutta	...	X	...	X	...	...
Speckled dace, Rhinichtys osculus	X	...	X	...	...	...
Golden shiner Notemigonus crysoleucas	...	X	X	...	...	...
Roundtail chub, Gila robusta seminuda	X	...	X	...	...	X
Redside shiner, Richardsonius balteatus hydrophlox	...	X	X	...	...	...
Red shiner Notropis lutrensis	...	X	X	...	...	...
Spinedace, Virgin River, Lepidomeda mollispinis mollispinis	X	...	X	...	...	X
Woundfin, Plagopterus argentissimus	X	...	X	...	X	...
Flannelmouth sucker, Catostomus latpininnis	X	...	X	...	...	...
Desert sucker, Catostomus clarki	X	...	X	...	...	...
Black bullhead Ictalurus melas	...	X	X	...	...	...
Mosquito fish Gambusia affinis	...	X	X	...	...	...
Largemouth bass, Micropterus salmoides	...	X	...	X	...	...
Green sunfish Lepomis cyanellus	...	X	...	X	...	...
Bluegill, Lepomis macrochirus	...	X	...	X	...	...
Threadfin shad, Dorosoma petenense	...	X	X	...	...	...
Crappie, Pomoxis sp.	...	X	...	X	...	...
Goldfish, Carassius auratus	...	X	X	...	...	...

Source: American Fisheries Society, 1970. A List of Common and Scientific Names of Fishes from the United States and Canada. Special publication no. 6. Washington, D.C.

CULTURAL RESOURCES

Cultural resources, in the broadest sense, include any trace of human activity from the earliest human experience to the present time. However, in this report, cultural resources will only consider antiquities, or sites and artifacts that have existed 50 years or more. A site is defined as a physical, on-the-ground location where there is evidence of past human activity. Sites consist of any combination of artifacts (objects showing human usage or manipulation), and features (areas such as structures, fire pits, or rock art panels that also evidence human activity but are not actually objects, as such). Sites and artifacts can be either historic or prehistoric. All antiquities constitute a fragile and nonrenewable resource, i.e., human history.

Cultural resource data for Washington County were derived from existing publications and site forms, and a 1-percent random stratified sample of the project area conducted by BLM personnel in 1976.

This 1-percent survey initiated by BLM was built upon a stratified random sample of quarter sections on public land. The strata were vegetative zones, derived from existing overlays. There were eight vegetative zones: mountain shrub, pinyon-juniper, creosote, Joshua tree, big sage, desert shrub, blackbrush, and grass. One percent of the acreage of each vegetative type was surveyed. This survey was conducted to detect trends in the types and density of sites to be found in the different vegetative zones on public land, and to aid in management decisions.

The prime objective of the Hot Desert survey was to determine trends in aboriginal occupation of public land in Washington County. It is believed that this survey is adequate to project these trends and be of use as a predictive tool within recognized limits. Actual numbers of sites cannot be justifiably predicted; however, site density within categories (example, four to twelve sites per square mile) can be reliably discerned, as well as types of sites likely within certain vegetative zones. Table 2-13 shows the site distributions by vegetative type.

TABLE 2-13

Hot Desert Survey Site Distributions, Virgin River Planning Unit

Vegetative Type	Quarry	Flaking Station	Rock Shelter	Camp-site	Habitation	Historic	TOTALS
Big Sage	0	17	0	3	1	0	21
Pinyon-Juniper	3	13	1	6	7	0	30
Desert Shrub	4	14	0	1	0	0	19
Blackbrush	0	6	1	2	0	2	11
TOTAL	7	50	2	12	8	2	81

Source: BLM, 1976.

Figure 2-18 (foldout) shows the recorded archaeological sites within the Hot Desert area. Figure 2-19 (foldout) indicates the projected archaeological site density for the area. A tabulated list of the known 184 sites in the area, including the type of site (flaking station, petroglyphs, etc.) and the cultural affiliation can be found at the BLM Cedar City District Office.

The majority of known sites are from the Virgin-Kayenta Anasazi culture. The general pattern exhibited by the date of the BLM survey is that habitation sites increased in number, variety and complexity eastward toward the Virgin River (Wikle, 1976). There seems to have been a primary utilization of the western portion of the Hot Desert by the hunting-gathering people and of the eastern side by the sedentary agricultural people.

The Honeymoon Trail, which crosses the Hot Desert, has been nominated for the National Register of Historic Sites. Fort Pierce, another historic site occurring in the area, is on both the National and Utah State Registers. The Dominguez-Escalante Trail, which probably generates the most interest of any historic site in the project area, has been marked at all points where it crosses public land. Figure 2-18 (foldout) shows the historic sites and trails.

LAND USE

Introduction. The land ownership pattern within the boundaries of the Hot Desert ES area consists of approximately 69 percent public lands, 10 percent States of Utah and Arizona, and 21 percent private (table 2-14). Included within the 551,849 acres of public land are 15,391 acres in Arizona. An additional 720 acres of Forest Service land are included in the Allotment Management Plans for the area.

TABLE 2-14

Land Ownership and Agricultural Use

	Acres	Percent of Total
Ownership[a]		
Public lands	551,399	69
State	79,708	10
Private	163,334	21
Total	794,441	100
Agriculture	Acres	
Farmland		
Irrigated	32,400	
Dryland	27,618	
Total	60,018	

Source: Hurricane and Beaver Dam Unit Resource Analysis, 1972.
Note: Land Status computation dated January 12, 1977 from the proposed action.

[a]Includes Arizona allotments; excludes four allotments to be managed by Arizona Strip District and one by Beaver River Resource Area.

Activities on the State and private land relate directly to and affect public land. The major towns within the ES boundary are growing and expanding. Isolated tracts of public land within or close to towns are becoming increasingly valuable for development potential, open space, and recreational uses. Applications for land transactions such as patents for public purposes and for sale of public land indicate local interest. In step with this expansion, land uses (such as for transmission lines, pipelines, water wells, sporting events, scientific research, and exploratory drilling), which require rights-of-way or Special Land Use Permits are increasing.

Plans, Controls, and Constraints. Land use in the Hot Desert is affected by the plans and policies of Federal and State agencies. The following discussion describes the more important programs of other agencies and their relation to land use.

Federal Agencies

Bureau of Land Management. The Bureau of Land Management has the responsibility to administer public lands under the principles of multiple use (Public Law 94-579, Federal Land Policy and Management Act of 1976). The Virgin River Management Framework Plan (MFP) provides controls and constraints on various land uses in this ES area.

The Land Use Planning section of Chapter 1 explained how the MFP is used as a guideline and resolves conflicts between resource recommendations for land use as they pertain to the proposed action.

Approximately 43,000 acres of land in the Hot Desert area, included in areas withdrawn by the Bureau of Reclamation, are administered by BLM. Application for revocation of the withdrawn lands has been made.

Soil Conservation Service (SCS). In 1968, SCS received approval for the Warner Draw Watershed Plan for part of Washington County, Utah, under PL-566, the Watershed Protection and Flood Prevention Act. Two projects remain to be completed by SCS: the enlargement of the Frog Hollow Retention Structure and a series of flood retention structures north of the City of St. George. Preliminary work has begun on the Frog Hollow structure with some work being scheduled to be done

on the project north of St. George within the near future (Dee Potter 1976: personal communication).

The SCS assists livestock operators in formulating ranch management plans. The plans are based upon the carrying capacity of the private land involved, in conjunction with Federal, State, and private leases and permits.

State Agencies

States of Utah and Arizona. The State of Utah has jurisdiction over State-owned lands. The State can acquire land by exchange or State selection (Sections 2275 and 2276 of the Revised Statutes of the Act of August 27, 1958 as amended). Some sections have been identified and chosen for exchange or selection between the State and BLM; the process has not yet been completed (Lowell Johnson 1976: personal communication).

A list of sections for selection is on file in BLM Cedar City District Office and sections can be identified on BLM land status plats. Interest has been indicated for additional areas but applications have not yet been received. Four State sections in the Hot Desert area have been identified by BLM for exchange or acquisition. Some or parts of the sections are within grazing allotments.

There are no State and BLM land exchanges currently proposed or in progress for those portions of Arizona that are included in this environmental statement (William Lamb and Ferron Leavitt 1976: personal communication).

Most of the Hot Desert grazing allotments contain some State-owned lands. On these sections, the grazing privileges are usually leased to ranchers for use in conjunction with their livestock operations on public land. The leases are for a 10-year term. Range projects such as water improvements or seeding can be executed by the lessee within the lease boundaries (Lowell Johnson 1976: personal communication).

Utah State Parks and Recreation Division. Grazing is allowed within the confines of Dixie State Park except in the Snow Canyon area. The other State park in the ES area is Gunlock which has no grazing.

There are no plans to enlarge either park (Marvin Jensen 1976: personal communication).

Division of Wildlife Resources. Utah DWR owns approximately 2,440 acres of land in the Virgin River Planning Unit. The Division has requested BLM to consider an exchange of this property for public land in Beaver County, Utah (S.M. Clark and Floyd Coles 1976: personal communication).

Land Use. Traditionally, the Hot Desert area supports a variety of different land uses. The scenery is interesting and diverse and recreation-type activities are an important land use. Agricultural activities in the Hot Desert area are centered around farming and livestock grazing. The area is well serviced by a broad transportation network which is centered around highway travel. The following discussion describes these land uses in more detail.

Recreation. The recreational resources found on public land in the Hot Desert area are extensive and recreational activities occur on a broad land base, rather than on intensive and site-oriented areas. Important recreational uses include: hunting for mule deer and quail; viewing mule deer from the major roadways; viewing Joshua trees, barrel cactus, and yucca; using off-road vehicles on Sand Mountain; and visiting Red Mountain and LaVerkin Creek areas.

During the 5-year period from 1971 through 1975, an annual average of 8,381 hunter days and a harvest of 963 mule deer were attributable to public land. Hunting for Gambel's quail on public land in 1975 accounted for 5,428 hunter days and a harvest of 4,438 birds. Washington County as a whole, provided 8,135 hunter days and a harvest of 6,440 quail in 1975. This amounted to 23 percent of the total hunter days and 48 percent of the harvest for the entire State (Utah Division of Wildlife Resources, 1975 Big Game Harvest Report, Pub. No. 76-6).

Sightseeing is an important recreational activity in the area. Highway travelers viewing mule deer regard this as a valued experience. Fewer people purposely seek the opportunity to view interesting desert plants as they do for deer. However, the unique species seen in this

region have significant botanical sightseeing value. The Joshua Tree Natural Landmark area on the south end of the Beaver Dam Mountains is protected for several reasons, one of which is to preserve interesting desert plants in their native setting.

In 1976, approximately 6,400 visitors used the off-road-vehicle sites in the Sand Mountain area. Although rarely visited, Red Mountain is an 8,500-acre region of sharply eroded red rock cliffs and ruggedly sculptured terrain essentially untouched by modern man. The top of Red Mountain has the potential for wilderness value study. The proposed designation of recreational lands in the LaVerkin Creek area (see Land Use Chapter 1) would complement recreational use in adjacent Zion National Park.

Visual Resources. In order to evaluate and objectively quantify the scenic resource, BLM has developed the Visual Resource Management (VRM) system. This system was used to establish the VRM classes illustrated in figure 2-20 (foldout).

Classification involves evaluation of scenic quality, visual sensitivity and visibility. These three factors are used to determine the visual resource management class for an area. Areas are also assigned one of five possible visual management classes; for each class there is a different management objective defined in terms of visual tolerance to surface disturbance. Management objectives for each class are described as follows:

Class I. This class provides primarily for natural ecological changes only and is applied to primitive areas, some natural areas, and other similar areas where management activities are to be restricted.

Class II. Changes in any of the basic landscape elements, form, line, color or texture should not be evident in the management activity.

Class III. Changes in the basic elements, (form, line, color or texture) may be evident in the management activity. However, the changes should remain subordinate to the visual strength of the existing character.

Class IV. Changes may subordinate the original composition and character but must reflect what could be a natural occurrence within the characteristic landscape.

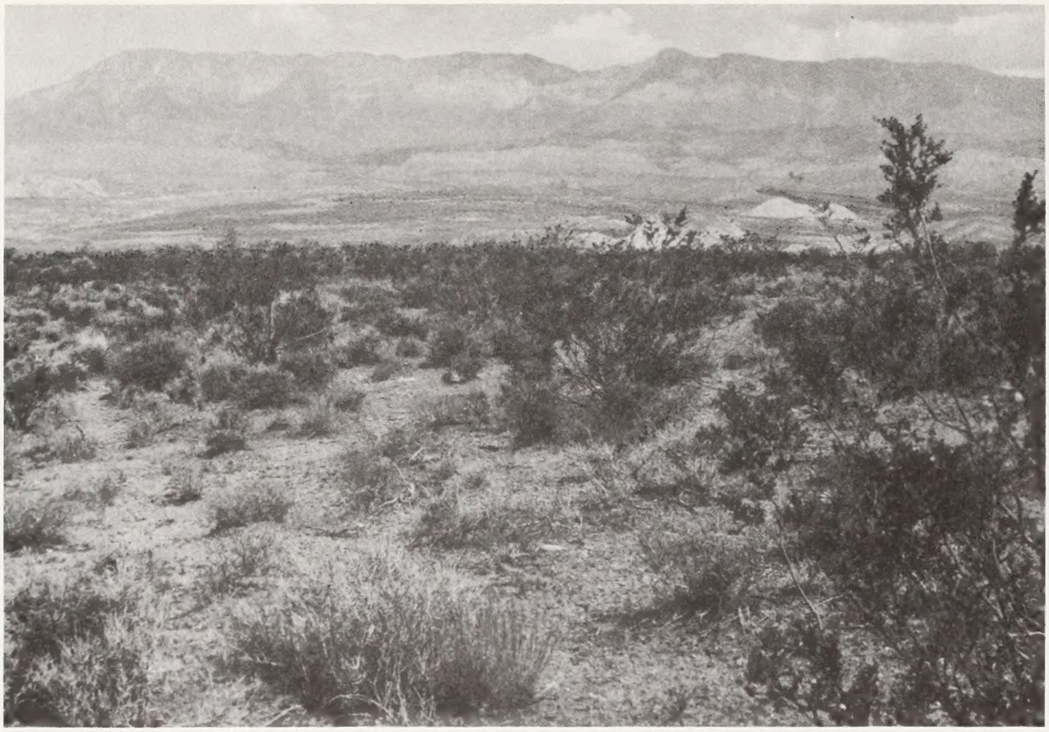
Class V. Change is needed. This class applies to areas where the naturalistic character has been disturbed to a point where rehabilitation is needed to bring it back into character with the surrounding countryside.

From the major roads in the Hot Desert region there are numerous distant scenic views of clifflines, mountainous areas, and mesas (fig. 2-21). Scattered stands of pinyon-juniper create an interesting visual texture typical of much of the higher-elevation landscapes in this area. Evidence of livestock management in the form of fencelines, pastures, and chained areas are common, with grazing livestock often being viewed as a reminder of a pleasant, simple, rural lifestyle.

Wilderness. The Wilderness Act, Public Law 88-577 and the Federal Land Policy Management Act, Public Law 94-579, define and identify wilderness areas primarily as areas of land over 5,000 acres in size, where the evidence of man's activity is almost nonexistent, where natural conditions dominate, and where there are outstanding opportunities for solitude and unconfined recreation.

Although public land in the Hot Desert area has not been inventoried for wilderness value at this time, it is anticipated that up to 50 percent of the area in nine sections as shown in figure 2-22, will be seriously studied for wilderness potential. This estimate is based on a preliminary review of the Cedar City District Transportation Plan and available data on existing developments. It is expected delays in implementation of the proposed action could result from the required wilderness review and inventory process.

Agriculture (nongrazing). Agriculture in Washington County consists of both irrigated and dryland farming in addition to livestock grazing. Irrigated crops are primarily alfalfa, small grains, some sugar beets and potatoes, fruits, and nuts. The principal dryland crop is wheat, and some small grains.



Pine Valley Mountains

Beaver Dam Slope

Figure 2-21
VISUAL RESOURCES

HOT DESERT ES

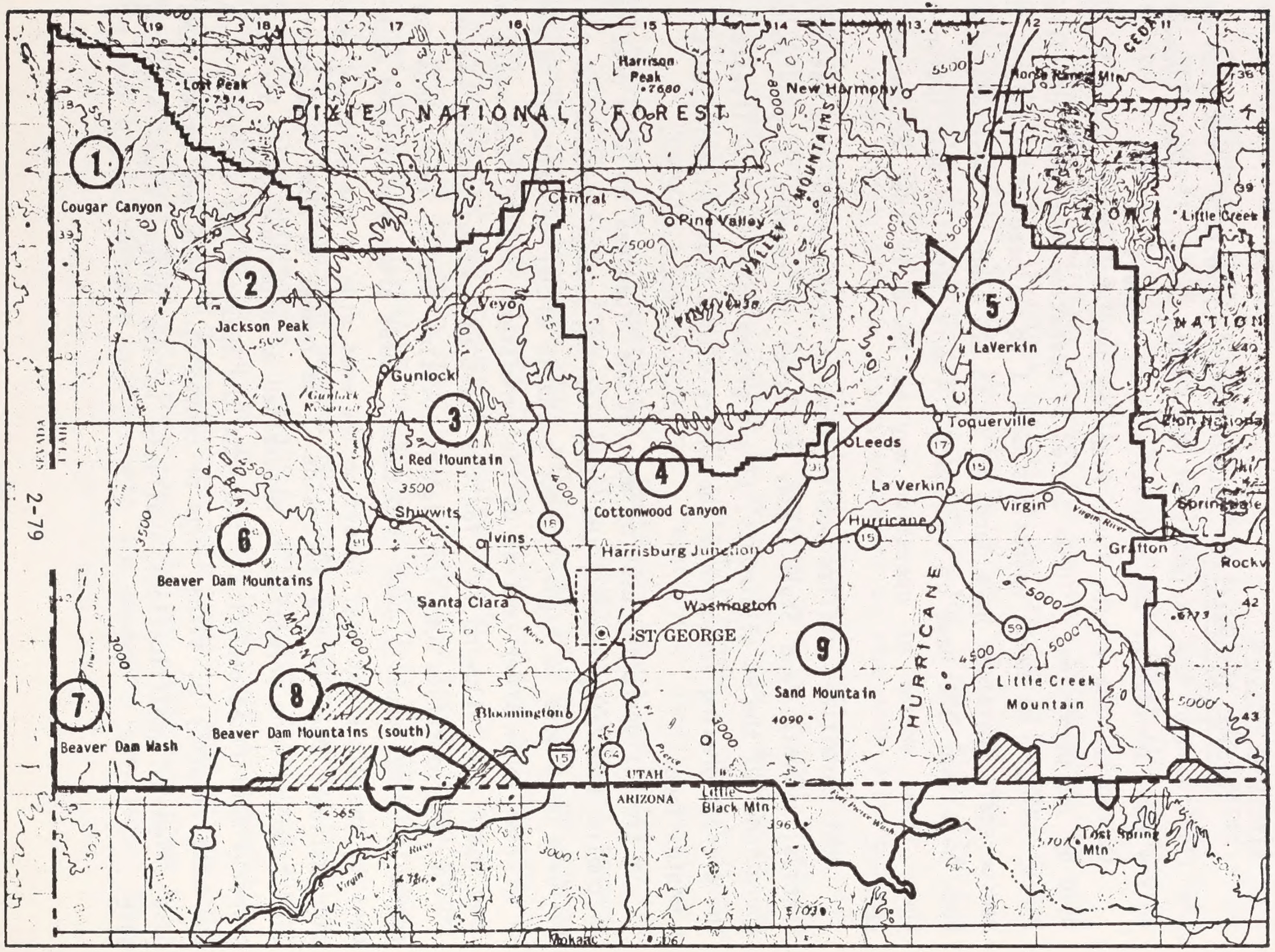


FIGURE 2-22

POTENTIAL WILDERNESS AREA

Irrigation in Washington County continues almost year-round, but the major periods are late February through late October. Planting of crops is also virtually year-round with January being the month of the least activity (Don Huber 1976: personal communication).

Livestock Grazing

General Information. Historically, livestock production was the livelihood of the residents of Washington County. Today, however, only a small portion of the population is so engaged.

Currently, the Virgin River Planning Unit has 84 allotments being used by 108 permittees. Three scales of operation have been identified (Beck, 1976): 63 small operations have 1 to 50 head of livestock; 35 medium-scale operators have herds of 50 to 125 head; 10 large operators each have over 125 head of livestock. A more detailed description of these three scales of operation may be found in the Socioeconomic section.

Most permittees utilize public land in conjunction with National Forests, private, and State lands in order to conduct a year-round operation. Of the 84 allotments, 11 are grazed year-round by livestock. The average grazing season over the entire Virgin River Planning Unit is 5 months long.

A typical operation used by most of the licensees includes grazing on public land range during the winter-spring season (October to May) followed by a move to higher summer pastures either on National Forest or private lands under control by the permittee. Public land would be used again the following fall for the start of another grazing season.

A few operators utilize higher-elevation public land range for summer grazing, usually June to October. These areas are located adjacent to the Dixie National Forest on the west side of the unit and near Zion National Park on the east side. The number of AUMs from public land licensed to a permittee is determined as a percentage of his base property qualifications (i.e., the AUMs the operator has available from the base property he either owns or controls). There are 28,905 AUMs Base Property Qualifications available in the Virgin River Planning Unit.

Three permittees in the planning unit are licensed for sheep use. The largest permit is for 700 sheep, while the smallest is for 300. One allotment is used entirely by sheep; on the other two allotments, sheep and cattle are run together.

One allotment (Pace Knoll) has had grazing use terminated since 1967 when the available forage was assigned to wildlife. Figure 2-23 (located in the pocket on the inside back cover) shows the location of the existing allotments in the unit.

There are 6 permittees licensed for horses. These horses are used in conjunction with livestock operations and are run in common with the permittee's cattle. Size of the permits ranges from 2 to 9 head.

A summary of present livestock use on the Virgin River Planning Unit is shown on table 2-15.

Forage utilization is highly dependent on livestock distribution. Topography, water, and salt locations directly control forage use. Currently, much of the Virgin River Planning Unit is in poor livestock forage production. Annual forage is extensively used. Because of the limiting distribution factors, some livestock forage is underutilized.

<u>Production Characteristics</u>. Washington County permittees generally have cow-calf operations. Semidesert ranges are better suited for producing calves than for putting weight on yearlings, because semidesert forage produces rapid weight gains only during the growing season. Income per animal unit is usually less for cow-yearling production than for cow-calf production (Paulsen, 1975).

Many of the operators trail their livestock to the different ranges. Others truck their livestock and maintain that it is economically feasible to do so.

Top beef production depends on proper husbandry of good quality animals. From information obtained by contact with permittees during 1975 and 1976 during the course of the Hot Desert AMP-ES preparation, most have not maximized production in this respect. Most of the permittees run their bulls with their cows yearlong. Poor calf crops with low and highly variable calf weights are generally prevalent. Cows

calve year round, limiting operator stability. Very few of the operators test their cows and heifers for pregnancy.

Culling does not seem to be uniformly controlled. Procedures are primarily controlled by forage and cow condition. As a general rule, very poor production records are maintained.

These breeding, culling, and recording characteristics reveal the management intensity, and as a result, the very poor economic returns to the management.

Transportation Networks. The main transportation artery of the area is Interstate 15 between Salt Lake City, Utah and Los Angeles, California, which dissects north-south through the county. Intermediate State and county roads service the population centers. The remainder of the county is crossed by county, private, and BLM roads, many of which are not regularly maintained and are usually unimproved.

Bus services are provided by Greyhound and Continental Trailways bus lines.

There is no railroad system servicing the county. Cedar City offers the closest rail freight service.

Most livestock are trucked to market. The largest market in the immediate area is at Cedar City, although some livestock are shipped via contract carriers to markets in surrounding states. Hay and other supplementary feed are also trucked in from outside areas.

TABLE 2-15

Existing Livestock Management

Allotment	Public Land	Base Property Qualifications (AUMs)	Livestock[a]	Season[b] of Use
Alger Hollow				
Alger Hollow	8,800	734	158C	11-5
Diamond Valley	1,730	80	40C	10-11
Wide Canyon	6,250	284	44C	11-5
Sand Wash	7,000	212	30C	YL
Apex Slope				
Apex Slope	5,879	366	1,130S	12-2 4-4
Beaver Dam Slope				
Santa Clara/ Beaver Dam Slope	35,030	1,547	533C	11-5
Indian Springs	21,400	1,150	489C	12-5
Castle Cliffs	12,060	614	110C	11-5
Big Mountain				
Big Mountain	9,126	490	100C	5-10
Boomer Hill				
Boomer Hill	940	56	28C	3-5
Cove Wash	3,387	100	23C	12-5
Boot Spring				
Boot Spring	2,118	100	40C	3-5
Bull Mountain				
Bull Mountain	14,519	373	3H 78C	12-9
Central				
Central	2,920	366	59C	10-5
Coalpits and Fault[c]				
Coalpits	2,525	166	55C	10-12 5-5
Fault	785	54	29C	12-4
Cougar Canyon				
Cougar Canyon	9,150	120	20C 4H	5-9

[a] Cattle numbers do not add due to seasonal overlap.
[b] Season of use - use to the nearest whole month.
[c] Custodial management included in intensive management allotments.
YL = Yearlong

(continued)

TABLE 2-15 (continued)

Allotment	Public Land	Base Property Qualifications (AUMs)	Livestock[a]	Season[b] of Use
Curly Hollow				
Curly Hollow	22,972	1,362	232C	11-5
Dagget Flat				
Dagget Flat	4,127	309	81C	6-9
Desert Inn				
Desert Inn	36,983	1,584	463C	YL
Dome				
Dome	2,188	186	110C	11-2 4-5
Warner Valley	880	159	37C	12-5
Fort Pierce				
Fort Pierce, UT	9,209	845	129C	11-5
Fort Pierce, AZ	13,818	384	32C	YL
Spendlove	7,654	810	120C	10-5
Gooseberry				
Gooseberry	4,440	256	45C	11-5
Grafton				
Grafton	7,258	448	100C 300S	11-5
Gunlock				
Gunlock	6,334	490	96C	10-5
Herd House[c]				
Herd House	2,870	140	40C	1-4
Hurricane[c]				
Hurricane	2,070	122	58C	10-5
Hurricane Fault				
Eagle	1,595	63	14C	10-5
Terrace	4,358	396	42C	YL
Frog Hollow	2,605	323	55C	10-5

[a]Cattle numbers do not add due to seasonal overlap.
[b]Season of use - use to the nearest whole month.
[c]Custodial management included in intensive management allotments.
YL = Yearlong

(continued)

TABLE 2-15 (continued)

Allotment	Public Land	Base Property Qualifications (AUMs)	Livestock[a]	Season[b] of Use
Hurricane Fault (concluded)				
Workman Wash	1,988	272	35C	10-5
Gould	8,300	633	88C	10-5
Gould Ranches	580	68	9H	10-5
Hurricane Mesa[c]				
Hurricane Mesa	6,811	225	98C	YL
Jackson Wash				
Jackson Wash	28,680	1,682	296C	11-5
Land Hill				
Land Hill	1,030	60	15C	2-5
Little Creek				
Little Creek	14,595	641	130C	YL
Mesa[c]				
Mesa	2,580	90	30C	8-4
Minera Wash				
Minera Wash	4,637	255	90C	3-5
Red Cliffs				
Red Cliffs	10,144	554	250C	1-5
Silver Reef	1,170	80	20C	1-5
Leeds	2,643	148	42C	12-5
Sand Mountain				
Sand Mountain Spring	1,930	240	38C	10-5
Sand	5,155	504	70C	10-5
Sand Mountain	14,000	1,556	247C	10-5
Sandstone Mountain				
Sandstone Mountain	2,531	114	38C	3-5
Santa Clara Creek				
Santa Clara Creek	3,038	117	51C	10-12 2-5

[a]Cattle numbers do not add due to seasonal overlap.
[b]Season of use - use to the nearest whole month.
[c]Custodial management included in intensive management allotments.
YL = Yearlong

(continued)

TABLE 2-15 (continued)

Allotment	Public Land	Base Property Qualifications (AUMs)	Livestock[a]	Season of Use[b]
Scarecrow Peak[c]				
Catclaw	3,410	228	83C	1-5
Terry	10,350	529	146C	11-4
Beaver Dam Wash	26,862	1,489	296C	11-5
Snow Holding Pasture	3,995	......	......	......
Short Creek				
Canaan Gap	2,616	228	95C	12-5
Canyon	581	60	10C	YL
Short Creek	1,983	228	32C	YL
Smith Mesa				
Smith Mesa	1,940	144	46C	YL
Toquerville				
Pintura	2,481	90	23C	1-5
Ash Creek	1,839	88	25C	2-5
LaVerkin	2,021	68	14C	12-5
Toquerville	4,734	146	50C	1-5
Trail				
Trail	3,220	240	650S 28C	12-5
Twin Peaks				
Twin Peaks	28,836	1,428	256C	YL
Veyo				
Veyo	8,056	342	88C	11-5
Virgin				
Virgin	4,890	183	46C	11-12 4-5
Mountain Dell	1,600	68	18C	1-5
Warner Ridge				
Warner Ridge	1,884	64	40C	2-5

[a]Cattle numbers do not add due to seasonal overlap.
[b]Season of use - use to the nearest whole month.
[c]Custodial management included in intensive management allotments.
YL = Yearlong

(continued)

TABLE 2-15 (continued)

Allotment	Public Land	Base Property Qualifications (AUMs)	Livestock[a]	Season[b] of Use
Washington				
Washington	9,765	248	88C	10-4
White Dome				
White Dome	2,507	35	46C	10-5
SUB TOTAL	505,862	27,834		
CUSTODIAL				
Airport				
Airport	147	9	6H	10-5
Black Canyon				
Black Canyon	600	15	5C	3-9
Box Canyon				
Box Canyon	659	48	19C	3-5
Cinder Mountain				
Cinder Mountain	2,240	154	147C	10-5
Dalton Wash				
Dalton Wash	855	33	20C	11-5
Lamoreaux				
Lamoreaux	160	55	200C	5-10
Little Plain				
Little Plain	930	60	15C	11-2
North Grafton[d]				
North Grafton	500	31	10C	2-4
Red Butte				
Red Butte	894	126	30C	YL
Rock Spring				
Rock Spring	820	85	125C	6-10

[a]Cattle numbers do not add due to seasonal overlap.
[b]Season of use - use to the nearest whole month.
[c]Custodial management included in intensive management allotments.
[d]North Grafton - formerly a part of Grafton Allotment.
YL = Yearlong

(continued)

TABLE 2-15 (concluded)

Allotment	Public Land	Base Property Qualifications (AUMs)	Livestock[a]	Season[b] of Use
Sand Hills				
Sand Hills	992	110	50C	12-5
Sand Wash Reservoir				
Sand Cove	640	41	12C	10-5
Stout				
Stout	235	19	10C	10-5
Yellow Knolls				
Yellow Knolls	525	123	15C 5H	10-5
SUB TOTAL	10,197	909		
ELIMINATION				
LaVerkin Creek				
LaVerkin Creek	10,716	99	36C	3-6
Pace Knoll				
Pace Knoll	1,885	NA	NA	NA
Pintura Seeding[e]				
Pintura	904	63	41C	4-5
SUB TOTAL	13,505	162		
TOTAL	529,564	28,905		

[a]Cattle numbers do not add due to seasonal overlap.
[b]Season of use - use to the nearest whole month.
[c]Custodial management included in intensive management allotments.
[d]North Grafton - formerly a part of Grafton Allotment.
[e]Pintura Seeding - formerly a part of Pintura Allotment.
YL = Yearlong

SOCIOECONOMICS

Introduction. The scope of social and economic analysis is limited to Washington County, the area of anticipated impact. Historically, this county has been directly dependent upon agriculture, especially the livestock industry; however, this has changed toward industrialization over the past 20 years. The trends of change can be seen in the increase in retirement-related facilities, subdivision of farmsteads, and the general lack of development of agriculture as compared to other economic sectors.

Regional Economy

Population. The population of Washington County is approximately 17,600; most of these people live in the immediate St. George-Hurricane area. Population increase for Washington County, between 1960 and 1970 was 33 percent, which is substantially higher than the 19 percent increase over the entire State. Washington County has 1.5 percent minorities. The county has equally numbered rural and urban populations. Appendix XVI illustrates the general population characteristics for the county.

Employment. The 1974 employment for the county was estimated at 5,273, with an unemployment rate of 6.6 percent. Appendix XVII reflects the employment sectors in the county. Trade and government supplies over 47 percent of total employment. Approximately 8 percent of the total employment is directly associated with agriculture, either as farm proprietors or wage and salary. Of those associated with agricultural production, 49 percent claim it as their principal occupation (1974 Census of Agriculture).

Personal Income. Total personal income in Washington County was over $33 million in 1973. Farm personal income accounted for 14 percent of the total personal income in the county (Appendix XVII).

General Information. In 1974, Washington County had 257 farms that supplied 10,706 cattle and calves (72 percent of all farms) and 52 farms selling 1,185 sheep and lambs. Inventories for cattle and calves were

19,925, sheep and lambs, 1,653. The number of cattle increased 6.7 percent from 1969 to 1974. Sheep inventories have declined, as noted nationally, at a rate of 23.2 percent for that period of time. Ninety-nine percent of the farms were operated by full or part owners, 87.6 percent of the farms having sales over $2,500 were individually or family controlled. The average age of the farm operator is 55.8 years (1974 Census of Agriculture).

Ranch Operations Utilizing Public Land. The BLM currently sells forage to 108 livestock operators who run livestock in Washington County. The 1974 Census of Agriculture reports that 162 farms in the county produced beef, therefore, over two-thirds of the livestock operators depend on public land for part of their forage requirements. Livestock operators are authorized to use 28,905 AUMs of forage in accordance with their base property qualifications (BPQ). Many of these individuals, however, do not stock at the level established in their BPQ. Only 68 percent of the BPQ was used in 1976.

Most livestock operations are marginal in net income and many permittees have other sources of employment. The total direct net income from public land is estimated to be $39,800 annually. Although this figure is small, very few operations could exist without public land forage. The poor economic conditions are a result of continued erratic market returns and increased costs reflected in most livestock operations in the western states. With the exception of 1973, the industry in Utah has had very low market prices (1950 and 1975 calf averages are identical). Appendix XVIII illustrates the instability in market returns for recent years in Utah.

During the past 40 years, permits to graze the public lands have taken on values greater than the fees charged (Roberts and Topham, 1965). Ranches have changed hands and public grazing permits have been sold along with the other ranching assets. Permit waivers have been given to lending agencies as collateral. The Internal Revenue Service and the Department of Defense have acknowledged the capital value of public land grazing privileges. Recent permit sales indicate the

capital value of BLM permits in Washington County ranges from $7 to $13 per AUM. The total capital value for permits in the county is estimated to be $255,300 (Appendix XIX).

The BLM does not officially recognize capitalized value of grazing permits because the permits are revokable and they do not convey a leasehold interest. However, the private sector does recognize capitalized value. The banking and lending agencies, Internal Revenue Service, and the permittees fully realize capitalized value of the permit. Therefore, in line with full disclosure requirements of NEPA, capitalized value is included in the analysis of the socioeconomic section of this statement.

TABLE 2-16

Operator Economic Summary, 1973 through 1975

	Small[a] Operator	Medium Operator	Large Operator
Number of operators	63	35	10
Total Federal AUMs[b]	6,718	12,911	9,275
Average gross income per AUM	$ 9.99	$ 11.71	$ 10.24
Average gross income trend	Declining	Declining	Declining
Average cost per AUM	$ 8.70	$ 9.60	$ 8.46[c]
Average cost trend	Increasing	Increasing	Unstable
Average net income per AUM	$ 1.33	$ 2.11	$ 2.77[c]
Average net income trend	Declining	Declining	Unstable
Total net income[d]	$ 6,394.64	$ 20,675.05	$12,761.39
Average capital value/AUM[e]	$ 8.66	$ 9.60	$ 8.46
Total capital value[d]	$56,723.00	$120,136.32	$78,466.50

[a] Small operators keep very few records; figures shown represent estimates
[b] Base property qualifications - maximum carrying capacity. Actual use may be lower.
[c] Includes returns to operator.
[d] Appendix XIX.
[e] Average cost method (Roberts and Topham, 1965).

Based on a recent economic study of Washington County permittees (Beck, 1976), the 108 livestock operators can be divided into three scales of operation: small (average of 20 head), medium (average of 105 head), and large (average of 288 head). Table 2-16 presents a summary of this study with additional data supplied. The following is a brief discussion of the three scales of operations:

Small Operations. The 63 small operations utilizing public land represent the largest percentage of the operations (58 percent); however, they control the least amount of the BPQ (23 percent). Small operators generally keep limited records, therefore, economic analysis is limited. The average gross income was estimated to be $9.99 per AUM. Income declined for the 3-year study period and costs increased to $8.66 per AUM leaving a declining net income of $1.33 per AUM. Only in 1973 were net incomes positive (table 2-17). The small-scale operations generate $6,395 in public land annual livestock income. The total capital value of their permits is $56,723.

Many livestock operators in this scale feel that livestock grazing is only a hobby. As a result, nearly all have limited management intensity and do not closely follow market and range conditions or trends. All of these individuals must have an alternate source of income.

Medium Operation. The medium scale operations (35) control 45 percent of the BPQ. Generally, these individuals keep more accurate production records. The average gross income per AUM ($11.71) is higher than that of the smaller operation, revealing a greater management intensity. Costs are higher ($9.60) and the average net income ($2.11) is considerably higher. Positive returns have occurred only once in the 3-year period (table 2-18). The net income from this scale is $20,675. The capital value is $120,136. Because of the low livestock income, other income is also required. Several operators in the medium scale have been forced to sell private property to maintain the operation. A few offer rental pasture to other producers. With few exceptions, these individuals hold other jobs.

TABLE 2-17

Income and Expenses for the Average Small Operation

	1973	1974	1975	3-Year Average
INCOME				
Calf sales	$3,560	$1,861	$1,256	$2,226
Cull sales	200	156	156	171
GROSS INCOME	$3,760	$2,017	$1,412	$2,397
EXPENSES				
Feed	$ 59	$ 69	$ 75	$ 68
Grazing fees	41	53	53	48
Veterinary	53	63	68	61
Machine repairs	273	322	350	315
Fuel and oil	312	368	400	360
Irrigation assessment	300	300	300	300
Taxes	372	385	401	386
Insurance	156	184	200	180
Depreciation	360	360	360	360
TOTAL EXPENSES	$1,926	$2,104	$2,207	$2,078
NET INCOME	$1,834.00	$(87.00)	$(795.00)	$319.00
NET INCOME PER COW	$ 91.70	$ (4.35)	$ (39.75)	$ 15.95
NET INCOME PER AUM	$ 7.64	$ (.36)	$ (3.31)	$ 1.33
AVERAGE COST PER COW	$ 96.30	$105.20	$ 110.35	$103.90
AVERAGE COST PER AUM	$ 8.03	$ 8.77	$ 9.20	$ 8.66
AVERAGE NUMBER OF COWS	....	....	....	20

Note: Small operators keep very few records; figures shown represent their estimates.

TABLE 2-18

Income and Expenses for the Average Medium Operation

	1973	1974	1975	3-Year Average
INCOME				
Calf and yearling sales	$17,042	$ 8,751	$ 8,618	$11,470
Cull sales	2,192	1,927	1,551	1,890
Pasture rent	1,198	1,426	1,551	1,392
GROSS INCOME	$20,432	$12,104	$11,720	$14,752
EXPENSES				
Feed	$ 1,898	$ 2,013	$ 2,064	$ 1,992
Grazing fees	940	1,106	1,302	1,116
Veterinary	57	42	41	47
Hired labor	1,406	958	921	1,095
Taxes	1,453	1,489	1,609	1,517
Insurance	134	288	307	243
Interest	416	735	508	553
Depreciation	2,327	2,327	2,324	2,326
Other fixed expenses[a]	3,022	3,268	3,314	3,201
TOTAL EXPENSES	$11,653	$12,226	$12,390	$12,090
NET INCOME	$ 8,779.00	$(122.00)	$(670.00)	$2,662.00
NET INCOME PER COW	$ 83.61	$ (1.16)	$ (6.38)	$ 25.35
NET INCOME PER AUM	$ 6.97	$ (0.1)	$ (0.53)	$ 2.11
AVERAGE COST PER COW	$ 110.98	$ 116.44	$ 118.00	$ 115.14
AVERAGE COST PER AUM	$ 9.25	$ 9.70	$ 9.83	$ 9.60
AVERAGE NUMBER OF COWS	....	....	....	105

[a]Water, utilities, repairs, supplies, fuel and miscellaneous expenses.

Large Operation. The few large producers (10) utilizing public land in Washington County control 32 percent of the BPQ forage. Most of these individuals are dependent upon agriculture for their income. Their economies to scale reflect the lowest costs ($8.46) and the highest net incomes ($2.77) per AUM. Some of the operations are incorporated and costs include salaries paid to the operator. This scale, as with the other two, had limited returns (table 2-19). Net incomes for this scale total $12,761. The capital value is $78,466. These individuals have made very marginal returns and many have been forced to sell private property or absorb losses from other agricultural production. Most of the capital and labor comes from the family.

Public Attitudes and Values

General Information. Historically, the area was settled by Mormon immigrants for agricultural purposes. Much of the culture is still centered around the Mormon religion.

Generally, two separate values seem to exist in relation to the proposed action, one related directly to the rural (ranch) population, the other, urban. Notably, the goals and values of the area are increasingly dominated by the urban sector. The following are generalizations about these two value systems:

Rural-Ranch Values and Attitudes. The American Gallup Poll from the late 1960s and early 1970s shows that farmers were still the most distinctive (and usually the most conservative) segment of the population in regard to many kinds of attitudes.

A major goal of the rural population of Washington County appears to be maintenance of their rural atmosphere and, consequently, the ranch as a business, home, and way of life. They see themselves as performing a useful function by providing the food vital to the population in an environment and lifestyle they prefer. Many feel that a cattle ranch leads to a higher status of total well being than could be achieved by any alternative mode of making a living and way of life. Invariably, Washington County ranchers feel that ranch ownership provides the best place to raise children. The ranching industry is an important way of

TABLE 2-19

Income and Expenses for the Average Large Operation

	1973	1974	1975	3-Year Average
INCOME				
Calf, yearling, and cull sales	$39,508	$19,929	$15,394	$24,944
Return to operator	3,242	4,133	2,400	3,258
Other income[a]	5,012	7,977	8,595	7,195
TOTAL INCOME	$47,762	$32,039	$26,389	$35,397
EXPENSES				
Feed	$ 1,762	$ 3,984	$ 2,929	$ 2,892
Grazing fees	2,114	2,771	3,969	2,951
Veterinary	108	275	201	195
Hired labor	372	1,025	1,417	956
Livestock trucking	727	782	987	832
Other fixed expenses[b]	15,976	22,618	15,891	18,162
TOTAL EXPENSES	$21,059	$31,455	$25,448	$25,987
NET INCOME	$26,763.00	$584.00	$941.00	$9,406.00
NET INCOME PER COW	$ 90.72	$ 2.03	$ 3.27	$ 32.66
NET INCOME PER AUM	$ 7.73	$ 0.17	$ 0.27	$ 2.77
AVERAGE COST PER COW[c]	$ 84.38	$123.57	$ 96.69	$ 101.55
AVERAGE COST PER AUM[c]	$ 7.03	$ 10.30	$ 8.06	$ 8.46
AVERAGE NUMBER OF COWS	....	....	....	288

[a]Interest and land sales.

[b]Water, utilities, repairs, supplies, fuel taxes, insurances, interest and other miscellaneous expenses.

[c]Includes returns to operator.

life and the ranchers prefer it to other occupations. In most cases in the county, the current ranch owner is a descendent of the previous owner, often through three and four generations. The historical bond is a reflection of the past and conveys a tradition that is safeguarded. In nearly all instances, Washington County ranchers intend to keep their ranches, expect that their children will go into ranching, and, if necessary, will seek outside sources of income for its survival.

Urban Values and Attitudes. Urban fundamentalism reflects other views. Urbanites tend to be less traditional with very limited economic family bonds. Sound economic returns on business operations are considered critical. Urban and rural attitudes are moving closer together; the rural attitudes giving way to urban attitudes.

FUTURE ENVIRONMENT WITHOUT THE PROPOSAL

The future environment without the proposed action is based on historical data as well as present and past trends.

Without the proposed action, it is anticipated the grazing program will continue on the present level of administration limited by shortages in funding and manpower and without sufficient management planning to stabilize the deterioration of the vegetative resource over the next 29 years (the projected maximum time frame of the proposed action, which includes a 5-year implementation period and a 24-year period to reach management objectives).

Without the proposed action, it will still be necessary to reduce the livestock stocking rate from 28,905 AUMs to 19,759 AUMs as indicated by the recent livestock forage inventory. The season of use, pastures and present allotments will remain the same. Only watershed and soil control structures will be built as needed.

Vegetation. Without the proposed action, there will be an increase in unpalatable and undesirable species in plant communities. There will be less available forage for livestock and wildlife. The livestock forage condition will continue to decline resulting in a need to further reduce livestock numbers periodically.

Vegetation in the heavily used areas, such as the riparian communities, will decline to a possible nonexistent state. The palatable threatened and endangered plant species may not be rested in time to avoid the harmful effects of livestock pressure. Even those plants not considered palatable may suffer trampling effects.

Soils. Data collected by BLM watershed study team and SCS range site information indicate the soil resource will continue to be lost at an accelerated rate over most of the statement area during the next 29 years.

This will be more serious in areas around St. George and Hurricane and south and east to the ES area boundary. At present, watershed studies indicate that average ground cover (vegetation, litter, and

rock) varies from 84 percent in the northwest to as little as 48 percent in the southeast part of the area and this is expected to decline further as a result of vegetative deteriorations in the future.

Wildlife

Deer. The deer herds on the west side of the planning unit seem to be increasing with fairly good reproduction, and they may increase regardless of grazing practices.

However, the situation on the east side, in areas such as Smith and Hurricane Mesas, will probably worsen. The browse in some of these areas is already in poor vigor and receiving heavy utilization by both wildlife and livestock. Unless the livestock usage is limited through management controls, browse production will continue to decline.

Birds. Quail habitat will be affected by a continuation of the present system. There will be some competition for the earlier annuals, especially in dry years, since cattle will be allowed to remain on public land throughout the spring every year. Overall cover will decrease as well as cover in riparian areas to the detriment of the quail.

In areas of present heavy livestock use, such as on Little Creek Mountain, stock ponds have been denuded of shoreline vegetation and this has some adverse effect on waterfowl. Waterfowl still use these ponds, even for occasional broodrearing, though not to the extent they would if cover was abundant.

Desert Tortoise. It is very difficult to predict the future outlook for the tortoises if the current grazing system is continued. Since the tortoise population is declining and there will be fewer and fewer individuals reproducing, population will probably continue to decline. Because of their low mobility, further competition for annuals will require additional foraging efforts and thereby increase nutritional stress on the remaining tortoises. Tortoise populations in the Woodbury study area will not be subject to nutritional stress resulting from competition with livestock for forage.

Water Resources and Fishes.

Water. Water resources within the ES area would be affected in the future if the proposed Allen-Warner energy system is developed (see Chapter 1). The Allen-Warner energy proposal would, if implemented, change flow patterns in the Virgin River. Flows would be reduced as a result of an offstream reservoir located in Warner Valley. The energy proposal would not affect other water resources in the ES area.

Water requirements on Federal lands are likely to increase by 100 acre-feet by the year 2000. No change in water quality is expected in the ES area with the exceptions mentioned above. Water quality would continue to decline or remain at present levels without project implementation.

Fish. The resultant decrease in water quality, will cause a decline in fish habitat. Sediment yield can increase water temperatures in the upper reaches of the streams with resulting decreases in fish population. Fish populations in the lower stretches of the streams will not be affected because they have generally adapted to higher sedimentation and temperatures. Fish that would be impacted would be the cold water fish (trout) in the upper Santa Clara and the west fork Beaver Dam Wash, although habitat is limited on public lands within the ES area. The warmer water resulting from loss of cover could benefit other fish (mostly native minnows) further downstream.

Riparian Areas. Without the proposed project, riparian areas could be expected to decline further due to the continued use of streamside vegetation by livestock. This use will result in bank sloughing, loss of cover, increased water temperature, unmoderated flood waters, limited no water recharge in these areas.

Land Use Plans and Controls. If the proposed action is not implemented, very little change will be evident in the various land uses.

Livestock. As the composition of the vegetative resource changes to less palatable and undesirable species of vegetation, livestock numbers will decrease and production will decline. In some areas where the browse species becomes dominant, a change in class of livestock from cattle to sheep will possibly occur.

This change could bring about a forced management system. The livestock operator might be economically unable to keep his operation running because of increased costs and a depleted livestock forage supply. Since a high percentage of the small livestock operators have marginal operations at the present time, they might be forced to sell out to larger operators. This would reduce the number of operators but not diminish the number of livestock proportionately. This economically forced management system could level off the number of livestock but continue to reduce the number of livestock operators.

Recreation. There will not be significant changes in recreational activity in the area.

The presence of Interstate 15, Zion National Park, and various State parks will insure continued high-volume usage in the area.

It is not expected that off-road-vehicle use will be changed except as population increases.

Visual Resources. Although vegetative and soil resources will be expected to decline, eventually affecting the visual resource, the changes in 29 years will probably not be detectable.

Population growth over 29 years may change zones currently rated medium sensitivity level to high sensitivity level zones. The low level sensitivity zones will probably remain in the low level category due to the undeveloped nature of the road systems.

Wilderness. The nine potential wilderness areas will eventually be inventoried for their roadless, primitive, and natural values. Recommendations will then be made indicating which zones should be classified and protected as wilderness areas. Actual designation procedures will involve public hearings and the writing of an environmental statement covering any proposed wilderness designations and wilderness management plans.

Cultural Resources. Without the proposed action, accelerated erosion will continue to have a damaging effect on the cultural resources over the next 29 years. To place the deterioration of the cultural resources in proper perspective, consideration must be given to the following causal agents in descending order of responsibility.

1. Relic hunters and vandals
2. Ground-disturbing activities involved with construction
3. Recent erosion accelerated by deforestation, land clearing, and grazing
4. Natural weathering and erosion

The overall downward trend of cultural resources will continue without the proposed action, but the increase will be more rapid as the population increases due to human destruction of antiquities.

Socioeconomic. The county population is currently increasing at a rapid annual rate of 5 percent (1970-1975) as more people immigrate to the area for its favorable climate (Utah Economic and Business Review, 1976). Regardless of the implementation of the proposal this increasing trend will continue.

Unless livestock market conditions become more equitable in the next 29 years, the existing trends in livestock production will continue. Those operators with unacceptable returns, both economic and social, may leave the industry. Many of the smaller operations could sell to those with more efficient production. Under the current market conditions, management intensity, forage condition, and existing trends in low ranch income are expected to continue.

Socially, the current attitudes and values should remain constant. The general attitude of the public reflects a demand for maximum management intensity for all their natural resources. The decline of wildlife habitat may increase concern for more improved range conditions.

CHAPTER 3

THE PROBABLE ENVIRONMENTAL IMPACTS

OF THE PROPOSED ACTION

CHAPTER 3
THE PROBABLE ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

INTRODUCTION

This chapter describes and evaluates the probable environmental impacts of the proposed action that would significantly affect the quality of the human environment.

The analysis of impacts presented is designed to be commensurate with the expected magnitude, intensity, duration, and incidence of impacts. Special consideration is given to environmental components protected by law and other environmental aspects considered to be of particular importance to man and his environment.

The ultimate significance of an impact depends upon its influence on the human environment, human activities, and human values. Therefore, the analysis of each impact has been traced from the proposed action to man and his environment. This requires following impacts from one environmental component to another until the ultimate significance of an impact has been evaluated. For example, the removal of vegetation during construction of a proposed project range development could eventually cause an adverse impact on recreation.

Each impact is analyzed in a cause and effect manner, and secondary impacts are identified and pursued as far as practical.

The cause identified is tied to a component of the project proposal (Chapter 1) and the effect identified is tied to a component of the environment (Chapter 2). Components in Chapter 2 that are not significantly impacted are not discussed in this chapter.

ASSUMPTIONS AND ANALYSIS GUIDELINES

Impacts were assessed with reference to the existing resource conditions. Where resource conditions would not be expected to improve sufficiently to reverse an existing downward trend, a negative impact was indicated. If, as a result of the proposed action, there would be a slight improvement but conditions would still continue downward, a negative impact was also indicated. Negative impacts were indicated where it was expected that a positive and beneficial resource condition would deteriorate.

Positive impacts would result where it was expected that adverse resource conditions would improve and definitely reverse any existing downward trends. Positive impacts were also indicated where it was expected that a beneficial and positive resource condition would improve over existing conditions. Positive impacts were indicated where deteriorating resource conditions were halted and stabilized with the proposal.

Where resource conditions were not expected to be affected either positively or negatively, no impact was indicated.

In the impact analysis of the Hot Desert Environmental Statement, (ES), the following assumptions were made to determine impacts:

1. Impacts were analyzed for the initial period of development before implementation (1 to 5 years) and for the time frame proposed to reach management objectives (up to 24 years);

2. Impacts of operating grazing management systems are categorized as short term (1 complete grazing cycle) or long term (more than one cycle - through the time frame attainment of objectives). It is recognized on those allotments where analysis indicates the objective will not be reached in the 24-year time frame that either the objective would never be reached, or it would be reached after a longer period. These allotments are shown in tables 3-5 through 3-11 as allotments negatively impacted. They are either mitigated in Chapter 4 or alternatives are offered in Chapter 8 to overcome the negative impact.

Chapter 6 addresses the cumulative impacts beyond the objectives' time frame;

3. Monitoring studies during grazing system cycles would be completed as indicated; the grazing management plans would be followed;

4. The principal resource directly impacted by the proposed action would be vegetation. Any changes in production, condition, trend, and potential of vegetation would affect other resources;

5. Wildlife would continue to graze rested pastures;

6. The necessary authorizing actions (Chapter 1) would be taken prior to implementation;

7. This analysis would address impacts generated by the proposed action and not other factors which led to its development such as the Management Framework Plan (MFP);

8. Socioeconomic analysis was made with the assumption that livestock market conditions would remain contant;

9. The socioeconomic analysis assumes that capital values of grazng permits would not change with the proposal;

10. Interim grazing management (Chapter 1) decision contained in the Virgin River MFP would be followed.

SOILS

Erosion and Infiltration. The following five factors were examined by allotment to determine expected changes in erosion and infiltration rates under the proposed action:

1. Changes in ground cover of vegetation and litter
2. Change in intensity of use from present situation
3. Susceptibility of soils to compaction within each allotment
4. Percent of soil in each allotment that is highly susceptible to erosion when the protective ground cover is reduced or eliminated
5. Change in season of use from present situation

The impacts to soil erosion as influenced by these five factors are summarized by allotment in table 3-1.

Soils that are sandy loam or finer in texture are susceptible to compaction by livestock, but to be of more than minor significance, grazing must occur during periods when soils are moist.

Allotments grazed during February and March at lower elevations and those grazed in February, March, August, and September at higher elevations, are susceptible to compaction because of potential soil moisture conditions. Appendix XXII summarizes the short-term and long-term impacts to erosion and infiltration by allotment. Table 3-1 discusses detailed causes and impact analysis by allotment. Table 3-2 lists erosion and infiltration rate impacts by acreage.

The increased and decreased rates of erosion and infiltration as shown in table 3-1 result from specific causes also noted in this table and described above.

It is difficult to predict the actual change in the rate of sediment yield resulting from impacts to the current existing rate tabulated for each allotment in table 2-5. Prediction can be made, however, to whether the rates would decrease or increase from the existing condition by looking at the specific impacts and how they would affect the factors that influence erosion and infiltration (Appendix VI).

TABLE 3-1

Analyses of Impacts to Soils

Allotment	Area Affected	Cause[a]	Percent[b]	Length of Impact	Impact	Impact Summary Short Term	Long Term
INTENSIVE MANAGEMENT							
Alger Hollow	All except seeding	Ground cover would increase very slowly. Intensity of use would not change on pastures grazed. There would be a slight reduction in soil compaction.	1	Long term Short term Long term Short term	Erosion would decrease Erosion would decrease Infiltration would increase Infiltration would increase	Positive	Positive
	Seeding	Ground cover would decrease slowly. Annuals would replace perennials in seeding pasture. Intensity of use would increase when grazed. Soil compaction would increase.	2	Long term Short term Long term Short term Long term Short term	Erosion would increase Erosion would increase Infiltration would decrease Infiltration would decrease Soil fertility would decrease Same	Negative	Negative
Apex Slope	Winter pastures	Ground cover of vegetation and litter would not increase overall. Intensity of use would increase.	15	Long term Short term Long term Short term Long term Short term	Erosion would increase Erosion would increase Infiltration would decrease Infiltration would decrease Soil fertility would decrease Soil fertility would decrease	Negative	Negative
	Spring pastures	Ground cover of vegetation and litter would increase slowly. Intensity of use would not change on pastures grazed. There would be a slight reduction in soil compaction.	25	Long term Short term Long term Short term	Erosion would decrease Erosion would decrease Infiltration would increase Infiltration would increase	Positive	Positive
Beaver Dam Slope	All	Ground cover would increase very slowly. Intensity of use would increase on grazed pastures. Soil compaction would increase.	16	Long term Short term Long term Short term	Erosion would decrease Erosion would increase Infiltration would increase Infiltration would decrease	Negative	Positive
Big Mountain	All	Ground cover would increase slowly. Intensity of use would not increase on pastures grazed. There would be a slight reduction in soil compaction.	0	Long term Short term Long term Short term	Erosion would decrease Erosion would decrease Infiltration would increase Infiltration would increase	Positive	Positive
Boomer Hill	All	Ground cover of vegetation and litter would increase slowly. Intensity of use would increase on pastures grazed. Soil compaction would increase.	18	Long term Short term Long term Short term	Erosion would decrease Erosion would increase Infiltration would increase Infiltration would decrease	Negative	Positive
Boot Spring	All	Ground cover would increase slowly. Intensity of use would remain the same on pastures grazed. Compaction would not change.	100	Long term Short term Long term Short term	Erosion would decrease Erosion would decrease Infiltration - no change Infiltration - no change	Positive	Positive

[a]Intensity of use is considered in terms of numbers of livestock over time. In some cases, the proposed action would increase the number of livestock on a pasture for a shorter period of time.
[b]Amount of the allotment having a high potential for erosion.

(continued)

TABLE 3-1 (continued)

Allotment	Area Affected	Cause[a]	Percent[b]	Length of Impact	Impact	Impact Summary Short Term	Impact Summary Long Term
Bull Mountain	All	Ground cover would increase very slowly. Riparian would show a loss of vigor on heavily used areas. Intensity of use would decrease on pastures grazed. Soil compaction would not change.	0	Long term Short term Long term Short term	Erosion would decrease Erosion would decrease Infiltration would increase Infiltration would increase	Positive	Positive
				Long term Short term	Soil erosion and bank caving would increase in riparian areas Same	Negative	Negative
Central	All	Ground cover would increase very slowly. Intensity of use would decrease on pastures grazed. Soil compaction would decrease.	0	Long term Short term Long term Short term	Erosion would decrease Erosion would decrease Infiltration would increase Infiltration would increase	Positive	Positive
Coalpits	All except Fault, private pastures	Ground cover would increase slowly. Intensity of use would decrease on pastures grazed. Soil compaction would not change.	40	Long term Short term Long term Short term	Erosion would decrease Erosion would decrease Infiltration would increase Infiltration would increase	Positive	Positive
Cougar Canyon	All	Ground cover would increase slowly. Intensity of use would increase. Soil compaction would not change. No soils have a high erosion potential. Riparian would show a loss of vigor n heavily used areas.	0	Long term Short term Long term Short term	Erosion would decrease Erosion would not change Infiltration would increase Infiltration would not change	No impact	Positive
Curly Hollow	All	Ground cover would increase slowly. Intensity of use would decrease on pastures grazed. Soil compaction would decrease slightly,.	71	Long term Short term Long term Short term	Erosion would decrease Erosion would decrease Infiltration would decrease Infiltration would decrease	Positive	Positive
Dagget Flat	All	Ground cover would decrease slowly. Annuals would replace perennials with seeding pasture being used heaviest. Intensity of use would increase on pastures grazed. Soil compaction would not change.	0	Long term Short term Long term Short term Long term Short term	Erosion would increase Erosion would increase Infiltration would decrease Infiltration would decrease Soil fertility would decrease Soil fertility would decrease	Negative	Negative
Desert Inn	Deferred	Ground cover would increase slowly. Riparian would be trampled and vigor reduced. Intensity of use would remain the same. Soil compaction would not change.	0	Long term Short term Long term Short term	Erosion would decrease Erosion would decrease Infiltration would increase Infiltration would increase	Positive	Positive

[a]Intensity of use is considered in terms of numbers of livestock over time. In some cases, the proposed action would increase the number of livestock on a pasture for a shorter period of time.
[b]Amount of the allotment having a high potential for erosion.

(continued)

TABLE 3-1 (continued)

Allotment	Area Affected	Cause[a]	Percent[b]	Length of Impact	Impact	Impact Summary Short Term	Impact Summary Long Term
Desert Inn (continued)	Deferred			Long term	Soil erosion and bank caving would increase in riparian areas	Negative	Negative
				Short term	Same		
	All except deferred	Ground cover would increase very slowly. Riparian would show a loss of vigor on heavily used areas. Intensity of use would increase on pastures grazed. Soil compaction would decrease.	57	Long term	Erosion would decrease	Positive	Positive
				Short term	Erosion would decrease		
				Long term	Infiltration would increase		
				Short term	Infiltration would increase		
				Long term	Soil erosion and bank caving would increase in riparian areas	Negative	Negative
				Short term	Same		
Dome	All	Ground cover would increase very slowly. Intensity of use would decrease on pastures grazed. Soil compaction would decrease.	50	Long term	Erosion would decrease	Positive	Positive
				Short term	Erosion would decrease		
				Long term	Infiltration would increase		
				Short term	Infiltration would increase		
Fort Pierce	All	Ground cover would increase very slowly. Intensity of use would increase on pastures grazed. Soil compaction would increase. Riparian would show a loss of vigor on heavily used areas.	36	Long term	Erosion would not change	Negative	Positive
				Short term	Erosion would increase		
				Long term	Infiltration would not change		
				Short term	Infiltration would decrease		
				Long term	Soil erosion and bank caving would increase in some riparian areas	Negative	Negative
				Short term	Same		
Gooseberry	All	Ground cover would increase very slowly. Intensity of use would remain the same on pastures grazed. Soil compaction would not change.	100	Long term	Erosion would decrease	Positive	Positive
				Short term	Erosion would decrease		
				Long term	Infiltration would increase		
				Short term	Infiltration would increase		
Grafton	All	Ground cover would increase very slowly. Riparian would show a loss of vigor on heavily used areas. Intensity of use would decrease on pastures grazed. Soil compaction would not change.	100	Long term	Erosion would decrease	Positive	Positive
				Short term	Erosion would decrease		
				Long term	Infiltration would increase		
				Short term	Infiltration would increase		
				Long term	Soil erosion and bank caving would increase in riparian areas	Negative	Negative
				Short term	Same		

[a]Intensity of use is considered in terms of numbers of livestock over time. In some cases, the proposed action would increase the number of livestock on a pasture for a shorter period of time.
[b]Amount of the allotment having a high potential for erosion.

(continued)

TABLE 3-1 (continued)

Allotment	Area Affected	Cause[a]	Percent[b]	Length of Impact	Impact	Impact Summary Short Term	Impact Summary Long Term
Hurricane	All	Ground cover would increase very slowly. Intensity of use would decrease on pastures grazed. Soil compaction would decrease.	0	Long term	Erosion would decrease	Positive	Positive
				Short term	Erosion would decrease		
				Long term	Infiltration would increase		
				Short term	Infiltration would increase		
Hurricane Fault	All	Ground cover would increase very slowly. Riparian would show a loss of vigor on heavily used areas. Intensity of use would not change on pastures grazed. Soil compaction would decrease slightly.	34	Long term	Erosion would decrease	Positive	Positive
				Short term	Erosion would decrease		
				Long term	Infiltration would increase		
				Short term	Infiltration would increase		
				Long term	Soil erosion and bank caving would increase in riparian areas	Negative	Negative
				Short term	Same		
Hurricane Mesa	All	Ground cover would increase slowly. Intensity of use would decrease. Soil compaction would remain the same.	100	Long term	Erosion would decrease	Positive	Positive
				Short term	Erosion would decrease		
				Long term	Infiltration would increase		
				Short term	Infiltration would increase		
Jackson Wash	Jackson Wash	Ground cover would increase very slowly. Intensity of use would not change on pastures grazed. Soil compaction would decrease slightly.	24	Long term	Erosion would decrease	Positive	Positive
				Short term	Erosion would decrease		
				Long term	Infiltration would increase		
				Short term	Infiltration would increase		
	Pahcoon Seeding Pasture	Ground cover would decrease slowly. Annuals would replace perennials in seeding pasture. Intensity of use would increase when grazed. Soil compaction would increase.	63	Long term	Erosion would increase	Negative	Negative
				Short term	Erosion would increase		
				Long term	Infiltration would decrease		
				Short term	Infiltration would decrease		
				Long term	Soil fertility would decrease		
				Short term	Same		
Land Hill	All	Ground cover would increase slowly. Intensity of use would decrease on pastures grazed. Compaction would decrease.	100	Long term	Erosion would decrease	Positive	Positive
				Short term	Erosion would decrease		
				Long term	Infiltration would increase		
				Short term	Infiltration would increase		
Little Creek	All	Ground cover would increase very slowly. Intensity of use would increase on pastures grazed. Soil compaction would not change.	100	Long term	Erosion would decrease	Negative	Positive
				Short term	Erosion would increase		
				Long term	Infiltration would increase		
				Short term	Infiltration would decrease		
Mesa	All except custodial	Ground cover would increase at a moderate rate. Intensity of use would decrease on pastures grazed. Compaction would not change.	100	Long term	Erosion would decrease	Positive	Positive
				Short term	Erosion would decrease		
				Long term	Infiltration would increase		
				Short term	Infiltration would increase		

[a]Intensity of use is considered in terms of numbers of livestock over time. In some cases, the proposed action would increase the number of livestock on a pasture for a shorter period of time.
[b]Amount of allotment having a high potential for erosion.

(continued)

TABLE 3-1 (continued)

Allotment	Area Affected	Cause[a]	Percent[b]	Length of Impact	Impact	Impact Summary Short Term	Impact Summary Long Term
Gunlock	All	Ground cover would increase slowly. Intensity of use would decrease on pastures grazed. Soil compaction would decrease. Riparian would show a loss of vigor on heavily used areas.	0	Long term Short term Long term Short term	Erosion would decrease Erosion would decrease Infiltration would increase Infiltration would increase	Positive	Positive
				Long term Short term	Soil erosion and bank caving would increase in riparian areas Same	Negative	Negative
Herd House	All except custo-dial	Ground cover would increase slowly. Intensity of use would not change on pastures grazed. Soil compaction would decrease slightly.	39	Long term Short term Long term Short term	Erosion would decrease Erosion would decrease Infiltration would increase Infiltration would increase	Positive	Positive
Minera Wash	All	Ground cover would increase very slowly. Intensity of use would decrease on pastures grazed. Soil compaction would decrease.	0	Long term Short term Long term Short term	Erosion would decrease Erosion would decrease Infiltration would increase Infiltration would increase	Positive	Positive
Red Cliffs	All	Ground cover would increase very slowly. Intensity of use would decrease on pastures grazed. Soil compaction would decrease. Riparian would show a loss of vigor on heavily used areas.	50	Long term Short term Long term Short term	Erosion would decrease Erosion would decrease Infiltration would increase Infiltration would increase	Positive	Positive
				Long term Short term	Soil erosion and bank caving would increase in riparian areas Same	Negative	Negative
Sand Mountain	All	Ground cover would increase very slowly. Intensity of use would not change in pastures grazed. Soil compaction would decrease.	75	Long term Short term Long term Short term	Erosion would decrease Erosion would decrease Infiltration would increase Infiltration would increase	Positive	Positive
Sandstone Mountain	All	Ground cover would increase very slowly. Intensity of use would decrease in pastures grazed. Soil compaction would decrease.	71	Long term Short term Long term Short term	Erosion would decrease Erosion would decrease Infiltration would increase Infiltration would increase	Positive	Positive
Santa Clara Creek	All	Ground cover would increase slowly. Intensity of use would not change in pastures grazed. Soil compaction would decrease.	100	Long term Short term Long term Short term	Erosion would decrease Erosion would decrease Infiltration would increase Infiltration would increase	Positive	Positive

[a]Intensity of use is considered in terms of numbers of livestock over time. In some cases, the proposed action would increase the number of livestock on a pasture for a shorter period of time.
[b]Amount of allotment having a high potential for erosion.

(continued)

TABLE 3-1 (continued)

Allotment	Area Affected	Cause[a]	Percent[b]	Length of Impact	Impact	Impact Summary Short Term	Impact Summary Long Term
Scarecrow Peak	All except Snow Holding Pasture	Ground cover would increase very slowly. Riparian would show a loss of vigor on heavily used areas. Intensity of use would not change in pastures grazed. Soil compaction would decrease.	0	Long term	Erosion would decrease	Positive	Positive
				Short term	Erosion would decrease		
				Long term	Infiltration would increase		
				Short term	Infiltration would increase		
				Long term	Soil erosion and bank caving would increase in riparian areas	Negative	Negative
				Short term	Same		
Short Creek	All	Ground cover would increase very slowly. Intensity of use would increase in pastures grazed. Soil compaction would not change or could increase slightly.	49	Long term	Erosion would decrease	Negative	Positive
				Short term	Erosion would increase		
				Long term	Infiltration would increase		
				Short term	Infiltration would decrease		
Smith Mesa	All	Ground cover would decrease at a slow rate. Intensity of use would decrease on pastures grazed. Compaction of soil would decrease.	21	Long term	No change in erosion	No impact	No impact
				Short term	No change in erosion		
				Long term	No change in infiltration		
				Short term	No change in infiltration		
Toquerville	All	Ground cover would increase very slowly. Intensity of use would decrease. Soil compaction would decrease slightly.	50	Long term	Erosion would decrease	Positive	Positive
				Short term	Erosion would decrease		
				Long term	Infiltration would increase		
				Short term	Infiltration would increase		
Trail	All	Ground cover would increase slowly. Intensity of use would increase on pastures grazed. Soil compaction would not change or could increase slightly.	65	Long term	Erosion would decrease	Negative	Positive
				Short term	Erosion would increase		
				Long term	Infiltration would increase		
				Short term	Infiltration would decrease		
Twin Peaks	All except seeding	Ground cover would increase very slowly. Intensity of use would increase on pastures grazed. Soil compaction would increase slightly.	24	Long term	Erosion would decrease	Negative	Positive
				Short term	Erosion would increase		
				Long term	Infiltration would increase		
				Short term	Infiltration would decrease		
	Seeding	Ground cover would decrease slowly. Annuals would replace perennials in seeding pasture. Intensity of use would increase when grazed. Soil compaction would increase.	24	Long term	Erosion would increase	Negative	Negative
				Short term	Erosion would increase		
				Long term	Infiltration would decrease		
				Short term	Infiltration would decrease		
				Long term	Soil fertility would decrease		
				Short term	Soil fertility would decrease		

[a]Intensity of use is considered in terms of numbers of livestock over time. In some cases, the proposed action would increase the number of livestock on a pasture for a shorter period of time.
[b]Allotment having a high potential for erosion.

(continued)

TABLE 3-1 (continued)

Allotment	Area Affected	Cause[a]	Percent[b]	Length of Impact	Impact	Impact Summary Short Term	Impact Summary Long Term
Veyo	All	Ground cover would increase very slowly. Intensity of use would increase on pastures grazed. Soil compaction would not change.	0	Long term Short term Long term Short term	Erosion would decrease Erosion would decrease Infiltration would increase Infiltration would increase	Positive	Positive
Virgin	All except custo-dial	Ground cover would increase slowly. Riparian would maintain poor vigor and be trampled around water. Intensity of use would decrease on pastures grazed. Soil compaction would not change.	96	Long term Short term Long term Short term	Erosion would decrease Erosion would decrease Infiltration would increase Infiltration would increase	Positive	Positive
				Long term Short term	Soil erosion and bank caving will increase in riparian areas Same	Negative	Negative
Warner Ridge	All	Ground cover would increase slowly.	0	Long term Short term Long term Short term	Erosion would decrease Erosion would decrease Infiltration would increase Infiltration would increase	Positive	Positive
Washington	All	Ground cover would increase slowly. Intensity of use would decrease on pastures grazed. Soil compaction would decrease slightly.	0	Long term Short term Long term Short term	Erosion would decrease Erosion would decrease Infiltration would increase Infiltration would increase	Positive	Positive
White Dome	All except custodial	Ground cover would increase slowly around water sources. Intensity of use would increase greatly on the pasture grazed. Soil compaction would increase.	0	Long term Short term Long term Short term	Erosion would decrease Erosion would increase Infiltration would decrease Infiltration would decrease	Negative	Positive
CUSTODIAL MANAGEMENT (see Glossary G-3)							
Airport	All	Ground cover would be maintained at its current level. Intensity of use would be reduced. Soil compaction would be reduced.	0	Long term Short term Long term Short term	Erosion would decrease Erosion would decrease Infiltration would increase Infiltration would increase	Positive	Positive
Black Canyon	All	Ground cover would decrease slowly. Intensity of use would decrease. Soil compaction would decrease.	56	Long term Short term Long term Short term Long term Short term	Erosion would increase Erosion would increase Infiltration - no change Infiltration - no change Soil fertility would decrease Soil fertility would decrease	Negative	Negative

[a]Intensity of use is considered in terms of numbers of livestock over time. In some cases, the proposed action would increase the number of livestock on a pasture for a shorter period of time.

[b]Amount of allotment having a high potential for erosion.

(continued)

TABLE 3-1 (continued)

Allotment	Area Affected	Cause[a]	Percent[b]	Length of Impact	Impact	Impact Summary Short Term	Impact Summary Long Term
Box Canyon	All	Ground cover would decrease slowly. Intensity of use would not change. Soil compaction would not change.	32	Long term	Erosion would increase	Negative	Negative
				Short term	Erosion would increase		
				Long term	Infiltration - no change		
				Short term	Infiltration - no change		
				Long term	Soil fertility would decrease		
				Short term	Soil fertility would decrease		
Cinder Mountain	All	Ground cover would increase slowly. Intensity of use would decrease. Soil compaction would decrease slightly.	89	Long term	Erosion would decrease	Positive	Positive
				Short term	Erosion would decrease		
				Long term	Infiltration would increase		
				Short term	Infiltration would increase		
Coalpits and Fault	Coalpits (custodial)	Ground cover would increase slowly. Intensity of use would decrease. Soil compaction would decrease slightly.	40	Long term	Erosion would decrease	Positive	Positive
				Short term	Erosion would decrease		
				Long term	Infiltration would increase		
				Short term	Infiltration would increase		
	Fault (custodial)	Ground cover would decrease slowly. Intensity of use would remain the same. Soil compaction would increase.	41	Long term	Erosion would increase	Negative	Negative
				Short term	Erosion would increase		
				Long term	Infiltration would decrease		
				Short term	Infiltration would decrease		
Dalton Wash	All	Ground cover would decrease slowly. Intensity of use would decrease. Soil compaction would decrease.	61	Long term	Erosion would increase	Negative	Negative
				Short term	Erosion would increase		
				Long term	Soil fertility would decrease		
				Short term	Soil fertility would not change		
Herd House	Custodial	Ground cover would decrease slowly. Intensity of use would remain the same. Soil compaction would increase.	0	Long term	Erosion would increase	Negative	Negative
				Short term	Erosion would increase		
				Long term	Infiltration would decrease		
				Short term	Infiltration would decrease		
				Long term	Soil fertility would decrease		
				Short term	Soil fertility would decrease		
Hurricane	Custodial	Ground cover would decrease slowly. Intensity of use would not change. Soil compaction would remain the same.	25	Long term	Erosion would increase	Negative	Negative
				Short term	Erosion would increase		
				Long term	Infiltration would decrease		
				Short term	Infiltration would decrease		
				Long term	Soil fertility would decrease		
				Short term	Soil fertility would decrease		

[a]Intensity of use is considered in terms of numbers of livestock over time. In some cases, the proposed action would increase the number of livestock on a pasture for a shorter period of time.
[b]Amount of allotment having a high potential for erosion.

(continued)

TABLE 3-1 (continued)

Allotment	Area Affected	Cause[a]	Percent[b]	Length of Impact	Impact	Impact Summary Short Term	Impact Summary Long Term
Hurricane Mesa	Cus-todial	Ground cover would decrease slowly. Intensity of use would decrease. Soil compaction would remain the same.	94	Long term	Erosion would increase	Negative	Negative
				Short term	Erosion would increase		
				Long term	Infiltration - no change		
				Short term	Infiltration - no change		
				Long term	Soil fertility would decrease		
				Short term	Soil fertility would decrease		
Lamoreaux	All	Ground cover would decrease slowly. Intensity of use would decrease. Soil compaction would decrease.	50	Long term	No change in erosion	No impact	No impact
				Short term	No change in erosion		
				Long term	No change in infiltration		
				Short term	No change in infiltration		
Little Plain	All	Ground cover would increase slowly. Intensity of use would decrease. Soil compaction would not change.	96	Long term	Erosion would decrease	Positive	Positive
				Short term	Erosion would decrease		
				Long term	Infiltration would increase		
				Short term	Infiltration would increase		
Mesa	Cus-todial	Ground cover would decrease slowly. Intensity of use would decrease. Soil compaction would not change.	100	Long term	No change in erosion	No impact	No impact
				Short term	No change in erosion		
				Long term	No change in infiltration		
				Short term	No change in infiltration		
North Grafton	All	Ground cover would decrease slowly. Intensity of use would not change. Soil compaction would not change.	100	Long term	Erosion would increase	Negative	Negative
				Short term	Erosion would increase		
				Long term	Infiltration would decrease		
				Short term	Infiltration would decrease		
				Long term	Soil fertility would decrease		
				Short term	Soil fertility would decrease		
Red Butte	All	Ground cover would decrease slowly. Intensity of use would decrease. Soil compaction would not change.	57	Long term	No change in erosion	No impact	No impact
				Short term	No change in erosion		
				Long term	No change in infiltration		
				Short term	No change in infiltration		
Rock Spring	All	Ground cover would increase slowly. Intensity of use would decrease. Soil compaction would decrease.	75	Long term	Erosion would decrease	Positive	Positive
				Short term	Erosion would decrease		
				Long term	Infiltration would increase		
				Short term	Infiltration would increase.		
Sand Hills	All	Ground cover would decrease slowly. Intensity of use would decrease. Soil compaction would not change.	100	Long term	No change in erosion	No impact	No impact
				Short term	No change in erosion		
				Long term	No change in infiltration		
				Short term	No change in infiltration		

[a] Intensity of use is considered in terms of numbers of livestock over time. In some cases, the proposed action would increase the number of livestock on a pasture for a shorter period of time.
[b] Amount of allotment having a high potential for erosion.

(continued)

TABLE 3-1 (concluded)

Allotment	Area Affected	Cause[a]	Percent[b]	Length of Impact	Impact	Impact Summary Short Term	Impact Summary Long Term
Sand Wash Reservoir	All	Ground cover would decrease slowly. Intensity of use would decrease. Soil compaction would decrease.	0	Long term	No change in erosion	No impact	No impact
				Short term	No change in erosion		
				Long term	No change in infiltration		
				Short term	No change in infiltration		
Scarecrow Peak	Snow Holding Pasture	Ground cover would decrease slowly. Intensity of use would not change. Soil compaction would not change.	0	Long term	Erosion would increase	Negative	Negative
				Short term	Erosion would increase		
				Long term	Infiltration would decrease		
				Short term	Infiltration would decrease		
				Long term	Soil fertility would decrease		
				Short term	Soil fertility would decrease		
Stout	Cus-todial	Ground cover will increase slowly. Intensity of use would decrease. Soil compaction would not change.	97	Long term	Erosion would decrease	Positive	Positive
				Short term	Erosion would decrease		
				Long term	Infiltration would increase		
				Short term	Infiltration would increase		
Virgin (Mountain Dell)	Cus-todial	Ground cover would increase slowly. Intensity of use would decrease. Soil compaction would not change. Riparian would maintain poor vigor and be trampled around water.	96	Long term	Erosion would decrease	Positive	Positive
				Short term	Erosion would decrease		
				Long term	Infiltration would increase		
				Short term	Infiltration would increase		
				Long term	Soil erosion and bank caving would increase in riparian areas	Negative	Negative
				Short term	Same		
White Dome	Cus-todial	Ground cover would decrease slowly. Intensity of use would decrease. Soil compaction would increase.	74	Long term	Erosion would increase	Negative	Negative
				Short term	Erosion would increase		
				Long term	Infiltration would decrease		
				Short term	Infiltration would decrease		
				Long term	Soil fertility would decrease		
				Short term	Soil fertility would decrease		
Yellow Knolls	All	Ground cover would decrease slowly. Intensity of use would decrease. Soil compaction would not change.	0	Long term	No change in erosion	No impact	No impact
				Short term	No change in erosion		
				Long term	No change in infiltration		
				Short term	No change in infiltration		
ELIMINATION OF LIVESTOCK GRAZING							
LaVerkin Creek	All	Ground cover would increase at a rapid rate, particularly litter accumulation. Intensity of decrease. Soil compaction would decrease.	57	Long term	Erosion would decrease	Positive	Positive
				Short term	Erosion would decrease		
				Long term	Infiltration would increase		
				Short term	Infiltration would increase		
Pace Knoll	All	No change	0	No change	No change	No impact	No impact
Pintura Seeding	All	No change	0	No change	No change	No impact	No impact

[a]Intensity of use is considered in terms of numbers of livestock over time. In some cases, the proposed action would increase the number of livestock on a pasture for a shorter period of time.
[b]Amount of allotment having a high potential for erosion.

TABLE 3-2

Impacts to Erosion and Infiltration

Change	Erosion (acres) Short Term[a]	Long Term[b]
Reduce	328,872	493,085
Increase	182,662	27,599
No change	18,030	8,880
	Infiltration (acres)	
Reduce	116,641	44,877
Increase	387,995	438,228
No change	24,928	46,459

Note: Reduced erosion and increased infiltration would be positive impacts to the soil resource. Acreage estimates are conservative in that they represent the minimum improvement and maximum deterioration of the soil resource as a result of the proposed action.

[a]Short-term impacts are considered as being less than one complete grazing cycle and would occur upon implementation of the proposal.

[b]Long-term impacts are considered as occurring after one grazing cycle through the attainment of objective time frame (24 years) and the implementation interval (5 years).

By projecting the impact that would occur on each allotment (table 3-1) on the existing erosion potential of that allotment (table 2-5), an indication of the impacts to soils can be predicted. The results of this projection indicate that:

	Acres of Public Land	Percent of Total Public Land
Negative impact would occur on	27,599	5 percent
Positive impact would occur on	493,085	93 percent
No impact (no change) on	8,880	2 percent
	529,564	100 percent

By considering these impacts in terms of existing erosion potential (table 2-5), the following situation is predicted:

Area Having	Negative Impacts	Positive Impacts	No Change
High potential for erosion	6 percent 11,893 acres	92 percent 161,277 acres	2 percent 2,929 acres
Moderate potential for erosion	6 percent 13,440 acres	91 percent 186,721 acres	3 percent 5,042 acres
Slight potential for erosion	0.7 percent 1,065 acres	98.7 percent 146,288 acres	0.6 percent 909 acres

Appendix VI contains a description of how this prediction was made.

Although 92 percent of the soils having a high potential for erosion would be positively impacted by the proposed action, the overall effect on the reduction of sediment yield would be slight because much of the area is subject to geologic erosion. An estimate in the range of a 10 to 20-percent reduction could be expected. The estimate is based on evaluating the effect of the proposed action on the many variables that influence sediment yield. As demonstrated by the Universal Soil Loss Equation (SCS, 1976), which is used to predict rill and sheet erosion, the primary factors which influence the rate of erosion and that can be manipulated by management would be the amount of ground cover and the type of intense erosion control practices applied to a specific site. Because the proposed action does not prescribe intense erosion control practices such as contour stripping and because the most optimum increase in ground cover expected to occur as a result of the proposal would be up to 10 percent (Appendix II), the proposal would have little

effect on erosion rates. Other physical factors (which cannot be influenced by management) considered in the Universal Soil Loss Equation (USLE) have a pronounced effect on sediment rates. These factors include the amount and intensity of precipitation, the inherent erodibility of the soil, and the length and steepness of slopes as they relate to sediment movement and deposition. Appendix VI contains an explanation and sample calculation of the USLE for an area which would typically be found in the Hot Desert. The equation illustrates the relationships between the variables affecting soil loss from sheet and gully erosion and the influence of management on that loss. A short-term increase in erosion would be expected on all areas planned for mechanical manipulation until new plants increase sufficiently in density to protect the soil from erosive forces. This is anticipated to take a minimum of 3 years or one grazing cycle.

Soil Fertility. Since long-term soil erosion would increase on a maximum of 27,599 acres, this increased loss of soil could eventually affect the long-term soil fertility on those areas. As ground cover and litter decrease and soil is lost through erosion, soil fertility is eventually reduced. Table 3-3 lists the acreages by allotment where the soil would decrease in fertility. Soil fertility on 501,965 acres would remain static or improve because of reduced erosion.

Proposed Projects. The locations of proposed range developments were examined to determine effects on the soil resource. Erosion potential, seeding suitability, soil depth, texture, and depth to bedrock were examined to identify specific problems that could occur if the developments were implemented. Table 3-4 lists developments that have the potential to damage the soil resource. Increased erosion from proposed projects would be incurred on 2,280 acres and is included in tables 3-2 and 3-3. This figure includes the seeding projects only and not the small localized acreages associated with trough impacts.

Stream Bank Erosion. Stream bank erosion would continue on portions of the following ten allotments. Approximately 53.3 miles of stream bank out of the total 86.5 miles on public land would be affected.

Bull Mountain (8 miles)	Gunlock (2.5 miles)
Desert Inn (12.5 miles)	Grafton (less than .6 mile)
Hurricane Fault (5.25 miles)	Fort Pierce (3.5 miles)
Scarecrow Peak (6.5 miles)	Virgin (1.5 miles)
Red Cliffs (5.75 mile)	Cougar Canyon (7.25 miles)

The heavy use of these riparian areas for shade and water would cause physical damage from compaction and caving-in of sensitive stream bank areas. These areas are presently eroding and it is expected that erosion would continue under the proposed action although at a lower rate than is presently occurring.

TABLE 3-3

Maximum Acreage of Reduced Soil Fertility - Long Term

Allotment	Pasture or Area Affected	Public Land Acres
Alger Hollow	Seeding	800
Apex Slope	Winter Pasture	2,986
Black Canyon	All	600
Box Canyon	All	659
Bull Mountain	Riparian	804
Cougar Canyon	Riparian	261
Dagget Flat	All	4,127
Dalton Wash	All	855
Desert Inn	Riparian	450
Fault	Custodial	785
Fort Pierce	Riparian	126
Grafton	Riparian	22
Gunlock	Riparian	90
Herd House	Custodial	480
Hurricane	Custodial	160
Hurricane Fault	Riparian	189
Hurricane Mesa	Custodial	3,521
Jackson Wash	Seeding Pasture	4,730
North Grafton	Custodial	500
Red Cliffs	Riparian	207
Scarecrow Peak	Riparian	234
Scarecrow Peak	Snow Holding Pasture	3,495
Twin Peaks	Seeding	480
Virgin	Riparian	54
White Dome	Custodial	984
	TOTAL	27,599

The tabulation above includes those allotments where soils would decrease in fertility in the long term (table 3-1) as well as the riparian areas where erosion would increase.

TABLE 3-4

Proposed Developments that Would Adversely Affect Soil Resources

Proposed AMP	Development (Proposed Project)	Impact	Explanation
Alger Hollow	Seeding (disk & seed)	Increased soil erosion	Soils at the site of this proposed 800-acre seeding are not suitable for seeding (chaining) because of shallow depths and low available water-holding capacities. Chances are low that an adequate ground cover would be reestablished to protect the soil resource.
Boot Spring	Trough	Increased soil erosion	The trough is proposed for installation on a soil with a high erosion potential. Removal of protective ground cover would result in increased erosion.
Desert Inn	Square Mountain Catchment	Increased soil erosion	This proposed catchment is within an area of high erosion potential. If lifestock are concentrated at a new water source in this potentially erosive soil, increased erosion would result.
Hurricane Fault	Trough	Increased soil erosion	Three watering troughs are proposed on soils with high erosion potentials. If livestock are concentrated at a new water source in this potentially erosive soil, increased erosion would result.
Jackson Wash	Pahcoon Seeding	Increased soil erosion	Soils over one half of project area of 2,000 acres are not suitable for mechanical manipulation. Shallow depths, steep slopes, and low available water holding capacities limit seeding opportunities. Chances are low that an adequate ground cover would be reestablished to protect the soil resource on about 1,000 acres.
Short Creek	Troughs	Increased soil erosion	Two troughs are proposed on soils with high erosion potential. If livestock are concentrated at a new water source in this potentially erosive soil, increased erosion would result.
Toquerville	Trough (haul water)	Increased soil erosion	This trough is proposed on soils with a high erosion potential. If livestock are concentrated at a new water source in this potentially erosive soil, increased erosion would result.
Trail	Trough	Increased soil erosion	The trough is proposed on soils that have a high erosion potential. If livestock are concentrated at a new water source in this potentially erosive soil, increased erosion would result.
Twin Peaks	Seeding	Increased soil erosion	Soils on the proposed 480-acre seeding area have a low available water-holding capacity. If seeding is not done preceding a period of above-average precipitation, the chances are low that an adequate ground cover would be reestablished to protect the soil resource.

Note: Mitigating Measures (Chapter 4) or Alternatives (Chapter 8) have been developed for these impacts.

VEGETATION

Introduction. Each of the proposed grazing systems was analyzed to identify how each system would impact vegetation in relation to range condition, apparent range trend, forage production, and potential attainment of objectives. For a general description on how grazing affects vegetation, see Appendix XXI. The impact would be caused by grazing livestock but the degree of impact is determined by the percent of the current growth removed, the amount of rest a plant receives during the growing period and between grazing treatments, and the season when plants are used and management and development practices are applied. Impacts are identified and analyzed in relation to the existing and future environment (Chapter 2).

Specific Impacts. Each proposed grazing allotment has a grazing system designed for that particular allotment. Allotments with similar grazing systems have been grouped for impact analyses. Each analysis of the different grazing systems has the same format. Typical impacts are described at the top of the impact table. Specific analyses follow for each allotment and existing resource conditions are compared to the typical situation. In order to compare impacts and differentiate the magnitude of each impact between allotments, a scale of comparison was developed (Appendix XXII) to indicate the existing (20,767 AUMs) and potential (27,926 AUMs) of livestock forage production for each allotment. The following is a discussion of the analysis by grazing system:

Three-Pasture System That Incorporates a Rest Period. There are 25 allotments with a total of 378,857 acres of public land proposed to be managed under grazing systems that incorporate at least a 1-year rest period as a primary treatment. The vegetation analyses are divided into two categories: 3-pasture systems and 2-pasture systems. The 10,962 acres and 428 AUMs proposed for 1-pasture systems are included in the analyses of 3-pasture systems because the effect of rest on vegetation is similar. Table 3-5 summarizes impacts anticipated for these allotments. Of the 25 allotments, 23 are expected to show a positive result

with livestock forage condition, apparent trend, and forage production all improving, and it is expected that an increase in forage production would occur.

Dagget Flat and Jackson Wash Allotments are expected to show negative results because of the heavy livestock use on one of the pastures. Anticipated use would be over 90 percent of the current year's growth of the palatable species which would be double the proper grazing rate when grazed. A 2,000-acre seeding is proposed for Jackson Wash Allotment. Available soils data indicate this seeding would not be entirely successful on 1,000 acres. Because successful and unsuccessful seedings are found in the surrounding area, a soil analysis in greater detail is needed. The analysis in table 3-5 shows that if the seeding would not be successful, an imbalance in grazing capacity would occur in the Jackson Wash Allotment. The Dagget Flat AMP allows cattle to drift from one pasture to another allowing for utilization of two pastures at the same time for part of the use period. This is a common practice and generally improves forage utilization. However, in this situation, it is anticipated that cattle would concentrate in one pasture with existing seedings and then remain to graze the green regrowth. Because of this, anticipated use would be over 90 percent of the current year's growth of the palatable species, which would be nearly double the proper grazing level of utilization.

Six allotments involving 110,442 acres would not be expected to reach the potential production in the proposed time frame because of the heavy grazing use, poor vigor, and low density of desirable forage species. Objectives would be accomplished after the time frame on four of these allotments. Dagget Flat and Jackson Wash would not reach the management objectives because of heavy forage utilization.

Two-Pasture System Incorporating Rest. There are seven allotments involving 22,414 acres of public land proposed to be managed under this grazing system. Impact analyses for five of the seven allotments show positive results; production potentials and management objectives would be attained. The Apex winter pasture shows a negative result due to

very heavy grazing pressure at 2.5 times the proper grazing rate when grazed.

Although the proposed management system on the Smith Mesa Allotment provides for no grazing during the second year, a decline in palatable browse species would occur. This is a result of grazing at a rate that would be more than double the proper grazing rate when grazed and grazing the entire year. Deer use in this area is heavy and has contributed to a declining browse condition; cattle use at the level proposed would intensify the already negative impact to browse.

Trail Allotment and the spring pasture of Apex Allotment, a total of 6,113 acres, are expected to reach potential production within the proposed time frame. Four allotments (11,375 acres) would reach the potential after the time frame because palatable forage species are currently in low vigor, heavily used and have low densities. The Apex winter pasture and Smith Mesa Allotments (4,926 acres) would not reach potential production with the proposed action. See table 3-6 for the impact summary.

<u>Grazing Systems That Rotate the Delay of Grazing</u>. Four allotments involving 46,172 acres are proposed for management under a delay rotation grazing system. All four are expected to show positive results as summarized in table 3-7. All would reach potential production and management objectives within the time frame.

<u>Grazing Systems That Delay Grazing Each Year Until After the Growing Period</u>. Portions of two allotments involving 25,533 acres are proposed for delayed grazing systems. These areas would be expected to show positive impacts as summarized in table 3-8 and management objectives would be reached.

<u>Season Long-Winter Use</u>. There are seven allotments involving 20,546 acres of public land proposed to be managed under this system. Six are expected to show positive results as summarized in table 3-9, and they would reach management objectives within the time frame.

<u>Custodial Management</u> (see Glossary, G-3). There are 22 allotments or parts of allotments involving 22,537 acres that are proposed for

management under various types of season-long grazing systems. Six of the 22 are expected to show a positive result because no grazing would take place during the growing season. The other 16 allotments show a negative result due to proposed continued grazing year after year during the growing season. Table 3-10 summarizes the impacts. No specific management objectives other than maintenance of existing forage have been established for these allotments.

Elimination of Grazing. Three allotments (13,505 acres) are proposed for removal or elimination of domestic livestock grazing. One allotment would result in a positive impact on vegetation as summarized in table 3-11; vegetation on the other two allotments would not be impacted since they are not presently grazed.

Short-Term Impacts on Vegetation. Short-term vegetative impacts from the proposed grazing systems would occur during the first grazing cycle and would depend on the season and intensity of grazing. Generally, cool season grasses would benefit from grazing during the winter, during summer periods after they have reached maturity, and when they are rested from grazing and allowed to complete regular growth. Cool season grasses would be impacted most when grazed during spring growth periods. Warm season grasses would benefit most when grazed during the winter season and when rested from grazing. They would be negatively impacted when grazed at times when they are actively growing during late spring and summer periods. Woody plants would benefit most when grazed after they have reached maturity, usually during the late summer and fall. When grazed during the winter and when actively growing, woody plants would be negatively impacted. Rest would also benefit woody plants. Forbs and annuals would increase when grazing occurs during the spring period because desirable perennial species are unable to compete. They would not be affected by winter grazing but would be unable to compete with perennial vegetation when ranges are rested. Appendix XX contains a more detailed description of how plants are affected by grazing. Over the long term, negative impacts are reduced by resting pastures from grazing.

TABLE 3-5

Impacts on Vegetation: Proposed Three Pasture Grazing Systems that Incorporate a Rest Period

Grazing System or Allotment	Acres	Area Affected	Average Present Situation: Desirable Plant Vigor[a]	Average Present Situation: Apparent Trend	Season of Use	Percent Current Year's Growth Used (Palatable Species)	Resulting Impacts	Length of Impact	Livestock Forage Condition	Apparent Trend	Projected Change in Livestock Forage Production[b] (AUMs)	Percent of Potential in 24 Years	AUMs not Obligated to Livestock[c]	Impact Summary
TYPICAL Three Pasture	......	Total unit	Fair	Static	Fall, winter, spring	50	Cool season grass - gain vigor; produce seed; establish young plants. Warm season grass - same as cool season except would have opportunity for some growth after grazing that cool season would not. Forbs and annuals - natural competition would reduce most annuals in favor of perennials; annual forbs would decrease but perennial forbs may increase. Woody plants - would stay about the same but may decrease during unfavorable moisture years. Plant composition change - favors increase of warm season grass, then cool season grass. Litter accumulation - increased. Riparian - heavily used areas would continue to decline in vigor.	Long term	....	...	....	...	.....	....
Alger Hollow	23,780	Total	Poor	Static to down	Same as typical	Same as typical	Same as typical except a longer time would be required to show desired improvement because of poor plant vigor and downward trend	Long term	Improved	Up	Increased from 872 to 1,032	100	1,111	Positive

[a]Desirable plant vigor generally applies to most of the allotment that is currently used by livestock although localized exceptions exist. This is a visual observation from one point in time. Vigor estimates were included because they influence the kind and degree of impact and also affect the possibility of reaching potential forage production.
[b]See Appendix XXII for explanation of how AUMs were estimated and percent of potential was calculated.
[c]AUMs not obligated to livestock indicates the existing forage allocated to wildlife through the Bureau's Multiple Use Planning System (Chapter 1).

(continued)

TABLE 3-5 (continued)

Grazing System or Allotment	Acres	Area Affected	Average Present Situation: Desirable Plant Vigor[a]	Average Present Situation: Apparent Trend	Season of Use	Percent Current Year's Growth Used (Palatable Species)	Resulting Impacts	Length of Impact	Livestock Forage Condition	Apparent Trend	Projected Change in Livestock Forage Production (AUMs)[b]	Percent of Potential in 24 Years	AUMs not Obligated to Livestock[c]	Impact Summary
Beaver Dam Slope	68,490	Total	Poor	Static to down	Same as typical	Same as typical	Same as typical except a longer time would be required to show desired improvement because of poor plant vigor and downward trend	Long term	Improved	Up	Increased from 2,490 to 3,307	100	1,626	Positive
Bull Mountain	14,519	Total	Poor	Static to down	Same as typical	60 - middle pasture; rest typical	Same as typical except a longer time would be required to show desired improvement because of poor plant vigor and downward trend	Long term	Improved	Up	Increased from 100 to 121	85	1,131	Positive
Central	2,920	Total	Good	Down	Same as typical	Same as typical	Same as typical	Long term	Improved	Up	Increased from 368 to 432	100	74	Positive
Dagget Flat	4,127	Total	Poor	Static	Summer/Fall	90 to 100	Reduced palatable plants, especially cool season grasses and browse; favor increase in annuals and unpalatable species	Long term	Declined	Down	Reduced from 272 to 231	56	546	Negative
Desert Inn	21,726	Total	Same as typical		Same as typical	Same as typical	Same as typical	Long term	Improved	Up	Increased from 1,194 to 1,981	100	2,452	Positive
Dome	3,068	Total	Poor	Static to down	Same as typical	Same as typical	Same as typical, but slower response	Long term	Improved	Up	Increased from 120 to 139	89	64	Positive
Fort Pierce	30,681	Total	Poor	Down	Same as typical	Same as typical	Same as typical, but slower response	Long term	Improved	Up	Increased from 1,673 to 2,177	93	562	Positive

[a]Desirable plant vigor generally applies to most of the allotment that is currently used by livestock although localized exceptions exist. This is a visual observation from one point in time. Vigor estimates were included because they influence the kind and degree of impact and also affect the possibility of reaching potential forage production.
[b]See Appendix XXII for explanation of how AUMs were estimated and percent of potential was calculated.
[c]AUMs not obligated to livestock indicates the existing forage allocated to wildlife through the Bureau's Multiple Use Planning System (Chapter 1).

(continued)

TABLE 3-5 (continued)

Grazing System or Allotment	Acres	Area Affected	Average Present Situation: Desirable Plant Vigor[a]	Average Present Situation: Apparent Trend	Season of Use	Percent Current Year's Growth Used (Palatable Species)	Resulting Impacts	Length of Impact	Livestock Forage Condition	Apparent Trend	Projected Change in Livestock Forage Production (AUMs)[b]	Percent of Potential in 24 Years	AUMs not Obligated to Livestock[c]	Impact Summary
Goosebery	4,440	Total	Fair	Up	Same as typical	Same as typical	Same as typical	Long term	Improved	Up	Increased from 256 to 279	100	70	Positive
Grafton	7,258	Total	Same as typical		Same as typical	Same as typical	Same as typical	Long term	Improved	Up	Increased from 128 to 162	100	100	Positive
Hurricane	1,910	Total	Same as typical		Same as typical	Same as typical	Same as typical	Long term	Improved	Up	Increased from 84 to 101	100	40	Positive
Hurricane Fault	19,426	Total	Poor	Static to down	Same as typical	Same as typical	Same as typical, but slower response	Long term	Improved	Up	Increased from 1,218 to 1,393	89	72	Positive
Jackson Wash	28,680	Total	Poor	Static to down	Same as typical	80 to 100	Jackson Wash and Pahcoon pastures near typical, but seeding pasture would show decline in palatable species, especially browse; would favor increase in unpalatables and annuals	Long term	Declined	Down	Reduced from 1,450 to 1,232	71	682	Negative
Little Creek Mountain	14,595	Total	Fair	Down	Same as typical	Same as typical	Same as typical, but slower response	Long term	Improved	Up	Increased from 641 to 726	96	96	Positive
Minera Wash	4,637	Total	Poor	Down	Same as typical	35	Same as typical	Long term	Improved	Up	Increased from 206 to 259	100	435	Positive
Red Cliffs	13,957	Total	Poor	Down	Same as typical	Same as typical	Same as typical, but slower response	Long term	Improved	Up	Increased from 376 to 591	89	200	Positive
Sand Mountain	21,085	Total	Same as typical		Same as typical	Same as typical	Same as typical	Long term	Improved	Up	Increased from 1,477 to 2,285	100	706	Positive

[a]Desirable plant vigor generally applies to most of the allotment that is currently used by livestock although localized exceptions exist. This is a visual observation from one point in time. Vigor estimates were included because they influence the kind and degree of impact and also affect the possibility of reaching potential forage production.
[b]See Appendix XXII for explanation of how AUMs were estimated and percent of potential was calculated.
[c]AUMs not obligated to livestock indicates the existing forage allocated to wildlife through the Bureau's Multiple Use Planning System (Chapter 1).

(continued)

TABLE 3-5 (concluded)

Grazing System or Allotment	Acres	Area Affected	Average Present Situation: Desirable Plant Vigor[a]	Average Present Situation: Apparent Trend	Season of Use	Percent Current Year's Growth Used (Palatable Species)	Resulting Impacts	Length of Impact	Livestock Forage Condition	Apparent Trend	Projected Change in Livestock Forage Production[b] (AUMs)	Percent of Potential in 24 Years	AUMs not Obligated to Livestock[c]	Impact Summary
Sandstone Mountain	2,531	Total	Same as typical		Same as typical	35	Same as typical	Long term	Improved	Up	Increased from 93 to 147	100	65	Positive
Scarecrow Peak	40,622	Total	Same as typical		Same as typical	80 to 90	Same as typical, but slower response	Long term	Improved	Up	Increased from 1,680 to 1,903	90	971	Positive
Short Creek	5,100	Total	Same as typical[d]		Same as typical	Same as typical	Same as typical	Long term	Improved	Up	Increased from 555 to 634	100	117	Positive
Toquerville	11,075	Total	Same as typical	Down	Same as typical	Same as typical	Same as typical	Long term	Improved	Up	Increased from 188 to 243	100	233	Positive
Twin Peaks	18,560	Total	Poor	Down	Same as typical	Same as typical	Same as typical, but slower response	Long term	Improved	Up	Increased from 807 to 1,108	92	1,539	Positive
Veyo	8,056	Total	Poor	Same as typical	Same as typical	Same as typical	Same as typical	Long term	Improved	Up	Increased from 339 to 436	93	234	Positive
Virgin	5,650	Total	Same as typical		Same as typical	Same as typical	Same as typical	Long term	Improved	Up	Increased from 136 to 160	100	144	Positive
Warner Ridge	1,884	Total	Same as typical	Down	Same as typical	35	Same as typical	Long term	Improved	Up	Increased from 45 to 65	100	52	Positive
TOTAL	378,857													

[a]Desirable plant vigor generally applies to most of the allotment that is currently used by livestock although localized exceptions exist. This is a visual observation from one point in time. Vigor estimates were included because they influence the kind and degree of impact and also affect the possibility of reaching potential forage production.
[b]See Appendix XXII for explanation of how AUMs were estimated and percent of potential was calculated.
[c]AUMs not obligated to livestock indicates the existing forage allocated to wildlife through the Bureau's Multiple Use Planning System (Chapter 1).
[d]Canyon pasture poor; rest same as typical.

TABLE 3-6

Impacts on Vegetation: Proposed Two Pasture Grazing Systems That Incorporate a Rest Period

Grazing System or Allotment	Acres	Area Affected	Average Present Situation: Desirable Plant Vigor[a]	Average Present Situation: Apparent Trend	Season of Use	Percent Current Year's Growth Used (Palatable Species)	Resulting Impacts	Length of Impact	Livestock Forage Condition	Apparent Trend	Projected Change in Livestock Forage Production (AUMs)[b]	Percent of Potential in 24 Years	AUMs not Obligated to Livestock[c]	Impact Summary
TYPICAL two-pasture system - accumulated treatments	......	Total Area	Fair	Static	Winter	50	Cool season grass, warm season grass - positive impact. Forbs and annual grass - no change. Woody plants - positive impact. Plant composition change - slight favor for increase in perennial grass; decrease in palatable browse. Litter accumulation - slight increase. Riparian vegetation - loss of vigor and trampling damage would result in continued decline.	Long term	....	...	....	....	...	....
************														
Apex Slope	2,986	Winter pasture	Same as typical		Winter	75	Heavier use would cause slower improvement in grass species and much greater reduction in palatable browse. Annuals and unpalatable forbs may increase. Other aspects same as typical.	Long term	Declined	Down	Reduced from 280 to 225	74	76	Negative
	2,893	Spring pasture	Same as typical		Spring	40	Same as typical, but warm season grasses would be favored over cool season grasses, and improvement would be slower due to spring season of use.	Long term	Improved	Up	Increased from 86 to 94	97	54	Positive

[a]Desirable plant vigor generally applies to most of the allotment that is currently used by livestock although localized exceptions exist. This is a visual observation from one point in time. Vigor estimates were included because they influence the kind and degree of impact and also affect the possibility of reaching potential forage production.

[b]See Appendix XXII for explanation of how AUMs were estimated and percent of potential was calculated.

[c]AUMs not obligated to livestock indicates the existing forage allocated to wildlife through the Bureau's Multiple Use Planning System (Chapter 1).

(continued)

TABLE 3-6 (concluded)

Grazing System or Allotment	Acres	Area Affected	Average Present Situation: Desirable Plant Vigor[a]	Average Present Situation: Apparent Trend	Season of Use	Percent Current Year's Growth Used (Palatable Species)	Resulting Impacts	Length of Impact	Livestock Forage Condition	Apparent Trend	Projected Change in Livestock Forage Production (AUMs)[b]	Percent of Potential in 24 Years	AUMs not Obligated to Livestock[c]	Impact Summary
Boomer Hill	4,327	Total area	Poor	Same as typical	Same as typical	50	Same as typical, but slower recovery due to heavy use 1 year out of 2.	Long term	Improved	Up	Increased from 138 to 172	88	...	Positive
Boot Spring	2,118	Total area	Same as typical		Same as typical	Same as typical	Same as typical, but slower recovery due to heavy use 1 year out of 2.	Long term	Improved	Up	Increased from 60 to 74	85	...	Positive
Hurricane Mesa	3,290	Total area	Poor	Same as typical	Same as typical	22	Same as typical, but would favor browse improvement as well as perennial gross.	Long term	Improved	Up	Increased from 30 to 55	70	132	Positive
Mesa	1,640	Total area	Poor	Same as typical	Same as typical	20	Same as typical, but would favor browse improvement as well as perennial grass.	Long term	Improved	Up	Increased from 24 to 33	81	61	Positive
Smith Mesa[d]	1,940	Total Area	Poor	Same as typical	Yearlong	15	Yearlong use would reduce palatable species' vigor with little impact on unpalatable species. Palatable grass species would decline faster than browse.	Long term	Declined	Down	Reduced from 36 to 31	86	137	Negative
Trail	3,220	Total Area	Poor	Same as typical	Fall/ winter/ spring	Same as typical	Same as typical, but slower response due to spring use.	Long term	Improved	Up	Increased from 147 to 160	98	110	Positive
TOTAL	22,414													

[a] Desirable plant vigor generally applies to most of the allotment that is currently used by livestock although localized exceptions exist. This is a visual observation from one point in time. Vigor estimates were included because they influence the kind and degree of impact and also affect the possibility of reaching potential forage production.
[b] See Appendix XXII for explanation of how AUMs were estimated and percent of potential was calculated.
[c] AUMs not obligated to livestock indicates the existing forage allocated to wildlife through the Bureau's Multiple Use Planning System (Chapter 1).
[d] Deer use in this allotment is heavy and has contributed to a declining browse condition; cattle use at the level proposed would intensify the already negative impact to browse.

TABLE 3-7

Impacts on Vegetation: Proposed Grazing Systems that Rotate the Delay of Grazing

Grazing System or Allotment	Acres	Area Affected	Average Present Situation: Desirable Plant Vigor[a]	Average Present Situation: Apparent Trend	Season of Use	Percent Current Year's Growth Used (Palatable Species)	Resulting Impacts	Length of Impact	Livestock Forage Condition	Apparent Trend	Projected Change in Livestock Forage Production (AUMs)[b]	Percent of Potential in 24 Years	AUMs not Obligated to Livestock[c]	Impact Summary
Rotate the delay of grazing Accumulative treatments	......	Total area	Fair	Static	Spring/ summer	50	Cool season grass - positive impact. Warm season grass, forbs, annual grass, and woody plants - negative impact. Plant composition change - favors increase in cool season grasses; decline in annuals and browse. Litter accumulation - slight improvement. Riparian vegetation - reduction of vigor at watering places	Long term	....	...	....	....	...	....
Big Mountain	9,126	Total	Same as typical		Same as typical	Same as typical	Same as typical	Long term	Improved	Up	Increased from 325 to 422	100	908	Positive
Cougar Canyon	9,150	Total	Poor	Same as typical	Same as typical	Same as typical	Same as typical	Long term	Improved	Up	Increased from 120 to 365	100	766	Positive
Curly Hollow	21,562[d]	Total	Same as typical		Fall/ winter/ spring	Same as typical	Would favor warm season grasses over cool season grasses; browse maintained and litter increased; favor palatable species	Long term	Improved	Up	Increased from 987 to 1,404	100	530	Positive
Gunlock	6,334	Total	Poor	Down	Fall/ winter/ spring	Same as typical	Same as typical, but would favor warm season grasses and response would be slower due to the poor vigor, down trend, and longer season of use	Long term	Improved	Up	Increased from 240 to 323	92	80	Positive
TOTAL	46,172													

[a]Desirable plant vigor generally applies to most of the allotment that is currently used by livestock although localized exceptions exist. This is a visual observation from one point in time. Vigor estimates were included because they influence the kind and degree of impact and also affect the possibility of reaching potential forage production.
[b]See Appendix XXII for explanation of how AUMs were estimated and percent of potential was calculated.
[c]AUMs not obligated to livestock indicates the existing forage allocated to wildlife through the Bureau's Multiple Use Planning System (Chapter 1).
[d]Does not include Curly Hollow holding pasture 1,410 acres (p. 3-33).

TABLE 3-8

Impacts on Vegetation: Proposed Grazing Systems that Delay Grazing Each Year Until After the Growing Period

Grazing System or Allotment	Acres	Area Affected	Average Present Situation: Desirable Plant Vigor[a]	Average Present Situation: Apparent Trend	Season of Use	Percent Current Year's Growth Used (Palatable Species)	Resulting Impacts	Length of Impact	Livestock Forage Condition	Apparent Trend	Projected Change in Livestock Forage Production[b] (AUMs)	Percent of Potential in 24 Years	AUMs not Obligated to Livestock[c]	Impact Summary
TYPICAL delayed grazing system	......	Total Unit	Fair	Static	Summer after seed ripe of key forage species (see Appendix IV)	50	Cool season grass - use after plants mature so only slight reduction in vigor, but good seed trampling. Warm season grass - loss of vigor; some trampling of seed. Forbs and annual grass - very little change. Woody plants - loss of vigor. Plant composition change - favors increase of cool season grasses. Litter accumulation - increased. Riparian vegetation - heavy use near water would cause trampling damage and loss of plant vigor.	Long term	....	...	....	....	...	....
Desert Inn[d]	15,257	Summer pasture	Fair	Same as typical	Same as typical	Same as typical	Same as typical	Long term	Improved	Up	Increased from 141 to 270	100	e	Positive
Twin Peaks[d]	10,276	Summer pasture	Fair	Same as typical	Same as typical	Same as typical	Same as typical	Long term	Improved	Up	Increased from 305 to 447	100	e	Positive
TOTAL	25,533													

[a] Desirable plant vigor generally applies to most of the allotment that is currently used by livestock although localized exceptions exist. This is a visual observation from one point in time. Vigor estimates were included because they influence the kind and degree of impact and also affect the possibility of reaching potential forage production.
[b] See Appendix XXII for explanation of how AUMs were estimated and percent of potential was calculated.
[c] AUMs not obligated to livestock indicates the existing forage allocated to wildlife through the Bureau's Multiple Use Planning System (Chapter 1).
[d] These are one pasture of a 4-pasture allotment.
[e] AUMs not obligated to livestock shown on table 3-5 "Impacts on Vegetation: Proposed Grazing Systems that Delay Grazing Each Year Until After the Growing Period" under Desert Inn and Twin Peaks Allotment.

TABLE 3-9

Impacts on Vegetation: Proposed Season-Long - Winter Use Grazing Systems

Grazing System or Allotment	Acres	Area Affected	Average Present Situation: Desirable Plant Vigor[a]	Average Present Situation: Apparent Trend	Season of Use	Percent Current Year's Growth Used (Palatable Species)	Resulting Impacts	Length of Impact	Livestock Forage Condition	Apparent Trend	Projected Change in Livestock Forage Production[b] (AUMs)	Percent of Potential in 24 Years	AUMs not Obligated to Livestock[c]	Impact Summary
TYPICAL continuous system	......	Total area	Fair	Static	Winter	50	Cool season grass, and warm season grass - vigor, seed production, and plant establishment enhanced. Some forbs and annual grass - natural competition would decrease. Woody plants - loss of vigor. Plant composition change - perennial grass increase; browse decrease. Litter accumulation - increased. Riparian vegetation - areas around watering places would continue to decline or remain in poor condition.	Long term	....	..	....	....	...	....
******														
Coalpits and Fault	1,390	Total	Same as typical		Same as typical	Same as typical	Same as typical	Long term	Improved	Up	Increased from 82 to 175	100	...	Positive
Curly Hollow	1,410[d]	Holding pasture	Same as typical		Fall/ winter/ spring	Same as typical	Same as typical Custodial Management	Long term	Declined	Down	Reduced from 69 to 59	86	e	Negative
Herd House	2,390	Total	Same as typical		Same as typical	Same as typical	Same as typical	Long term	Improved	Up	Increased from 105 to 120	100	...	Positive

[a]Desirable plant vigor generally applies to most of the allotment that is currently used by livestock although localized exceptions exist. This is a visual observation from one point in time. Vigor estimates were included because they influence the kind and degree of impact and also affect the possibility of reaching potential forage production.
[b]See Appendix XXII for explanation of how AUMs were estimated and percent of potential was calculated.
[c]AUMs not obligated to livestock indicates the existing forage allocated to wildlife through the Bureau's Multiple Use Planning System (Chapter 1).
[d]Included in Curly Hollow Allotment in table 1-10.
[e]Aums not obligated to livestock shown on table 3-5 "Impacts on Vegetation: Proposed Three Pasture Grazing Systems that Incorporate a Rest Period" under Curly Hollow Allotment.

(continued)

TABLE 3-9 (concluded)

Grazing System or Allotment	Acres	Area Affected	Average Present Situation: Desirable Plant Vigor[a]	Average Present Situation: Apparent Trend	Season of Use	Percent Current Year's Growth Used (Palatable Species)	Resulting Impacts	Length of Impact	Livestock Forage Condition	Apparent Trend	Projected Change in Livestock Forage Production[b] (AUMs)	Percent of Potential in 24 Years	AUMs not Obligated to Livestock[c]	Impact Summary
Land Hill	1,030	Total	Poor	Same as typical	Same as typical	Same as typical	Same as typical	Long term	Improved	Up	Increased from 39 to 54	92	27	Positive
Santa Clara Creek	3,038	Total	Poor	Same as typical	Same as typical	Same as typical	Same as typical	Long term	Improved	Up	Increased from 69 to 87	94	95	Positive
Washington	9,765	Total	Same as typical		Same as typical	Same as typical	Same as typical	Long term	Improved	Up	Increased from 153 to 158	91	306	Positive
White Dome	1,523	Total	Good	Same as typical	Same as typical	Same as typical	Same as typical	Long term	Improved	Up	Increased from 100 to 108	100	50	Positive
TOTAL	20,546													

[a]Desirable plant vigor generally applies to most of the allotment that is currently used by livestock although localized exceptions exist. This is a visual observation from one point in time. Vigor estimates were included because they influence the kind and degree of impact and also affect the possibility of reaching potential forage production.
[b]See Appendix XXII for explanation of how AUMs were estimated and percent of potential was calculated.
[c]AUMs not obligated to livestock indicates the existing forage allocated to wildlife through the Bureau's Multiple Use Planning System (Chapter 1).
[d]Included in Curly Hollow Allotment in table 1-10.
[e]AUMs not obligated to livestock shown on table 3-5 "Impacts on Vegetation: Proposed Three Pasture Grazing Systems that Incorporate a Rest Period" under Curly Hollow Allotment.

TABLE 3-10

Impacts on Vegetation: Proposed Custodial Management

Grazing System or Allotment	Acres	Area Affected	Average Present Situation: Desirable Plant Vigor[a]	Average Present Situation: Apparent Trend	Season of Use	Percent Current Year's Growth Used (Palatable Species)	Resulting Impacts	Length of Impact	Livestock Forage Condition	Apparent Trend	Projected Change in Livestock Forage Production (AUMs)[b]	Percent of Potential in 24 Years	AUMs not Obligated to Livestock[c]	Impact Summary
TYPICAL Custodial Management	......	Total	Poor	Static	Fall/ winter/ spring	50	Cool season grass, warm season grass, woody plants - negative impacts. Forbs and annual grass - positive impacts. Plant composition change - favors increase of annuals and unpalatable species; warm season grasses would be favored over cool season. Litter accumulation - reduced. Riparian vegetation - may be trampling damage and loss of plant vigor on small areas near watering places.	Long term	....	....	....	....	....	....
Airport	147	Total	Same as typical		Same as typical	Same as typical	Same as typical typical	Long term	Declined	Down	Reduced from 7 to 6	86	....	Negative
Black Canyon	600	Total	Same as typical		Spring/ summer	Same as typical	Same as typical, but cool season grasses would be favored over warm season grasses.	Long term	Declined	Down	Reduced from 12 to 10	83	....	Negative
Box Canyon	659	Total	Same as typical		Spring	Same as typical	Same as typical	Long term	Declined	Down	Reduced from 48 to 41	85	....	Negative

[a]Desirable plant vigor generally applies to most of the allotment that is currently used by livestock although localized exceptions exist. This is a visual observation from one point in time. Vigor estimates were included because they influence the kind and degree of impact and also affect the possibility of reaching potential forage production.
[b]See Appendix XXII for explanation of how AUMs were estimated and percent of potential was calculated.
[c]AUMs not obligated to livestock indicates the existing forage allocated to wildlife through the Bureau's Multiple Use Planning System (Chapter 1).

(continued)

TABLE 3-10 (continued)

Grazing System or Allotment	Acres	Area Affected	Average Present Situation: Desirable Plant Vigor[a]	Average Present Situation: Apparent Trend	Season of Use	Percent Current Year's Growth Used (Palatable Species)	Resulting Impacts	Length of Impact	Livestock Forage Condition	Apparent Trend	Projected Change in Livestock Forage Production (AUMs)[b]	Percent of Potential in 24 Years	AUMs not Obligated to Livestock[c]	Impact Summary
Cinder Mountain	2,240	Total	Same as typical		Winter	Same as typical	Cool season grass, and warm season grass - positive impact. Forbs, annual grass, and woody plants - negative impact. Plant composition change - favors increase of perennial grass. Litter accumulation - increase. Riparian vegetation - same as typical.	Long term	Improved	Up	Maintained at 27	100	....	Positive
Dalton Wash	855	Total	Same as typical		Same as typical	Same as typical	Same as typical	Long term	Declined	Down	Reduced from 26 to 22	85	....	Negative
Coalpits and Fault	1,350	Fault and private pastures	Same as typical		Same as typical	Same as typical	Same as typical	Long term	Declined	Down	Reduced from 54 to 46	85	....	Negative
	570	Upper Mesa	Same as typical		Fall/ winter	Same as typical	Cool season grass, warm season grass - positive impact. Forbs, annual grass, and woody plants - negative impact. Plant composition change - favors increase of perennial grass. Litter accumulation - increase. Riparian vegetation - same as typical.	Long term	Improved	Up	Maintained at 32	100	....	Positive
Herd House	480	Total	Same as typical		Spring	Same as typical	Same as typical	Long term	Declined	Down	Reduced from 33 to 28	85	....	Negative

[a]Desirable plant vigor generally applies to most of the allotment that is currently used by livestock although localized exceptions exist. This is a visual observation from one point in time. Vigor estimates were included because they influence the kind and degree of impact and also affect the possibility of reaching potential forage production.
[b]See Appendix XXII for explanation of how AUMs were estimated and percent of potential was calculated.
[c]AUMs not obligated to livestock indicates the existing forage allocated to wildlife through the Bureau's Multiple Use Planning System (Chapter 1).

(continued)

TABLE 3-10 (continued)

Grazing System or Allotment	Acres	Area Affected	Average Present Situation: Desirable Plant Vigor[a]	Average Present Situation: Apparent Trend	Season of Use	Percent Current Year's Growth Used (Palatable Species)	Resulting Impacts	Length of Impact	Livestock Forage Condition	Apparent Trend	Projected Change in Livestock Forage Production (AUMs)[b]	Percent of Potential in 24 Years	AUMs not Obligated to Livestock[c]	Impact Summary
Hurricane	160	Total	Same as typical		Same as typical	Same as typical	Same as typical	Long term	Declined	Down	Reduced from 12 to 10	83	....	Negative
Hurricane Mesa	3,521	Total	Same as typical		Year long	Same as typical	Same as typical	Long term	Declined	Down	Reduced from 49 to 42	86	....	Negative
Lamoreaux	160	Total	Same as typical		Spring/summer	Same as typical	Same as typical, but cool season grasses favored over warm season grasses	Long term	Declined	Down	Reduced from 11 to 9	82	....	Negative
Little Plains	930	Total	Same as typical		Winter	Same as typical	Cool season grass, warm season grass - positive impact. Forbs, annual grass, and woody plants - negative impact. Plant composition change - favors increase of perennial grass. Litter accumulation - increase. Riparian vegetation - same as typical.	Long term	Improved	Up	Maintained at 16	100	....	Positive
Mesa	940	Total	Same as typical		Same as typical	Same as typical	Same as typical	Long term	Declined	Down	Reduced from 17 to 14	82	....	Negative
North Grafton	500	Total	Same as typical		Spring	Same as typical	Same as typical	Long term	Declined	Down	Reduced from 12 to 10	83	....	Negative
Red Butte	894	Total	Same as typical		Spring/summer	Same as typical	Same as typical, but cool season grass favored over warm season grass	Long term	Declined	Down	Reduced from 12 to 10	83	....	Negative

[a]Desirable plant vigor generally applies to most of the allotment that is currently used by livestock although localized exceptions exist. This is a visual observation from one point in time. Vigor estimates were included because they influence the kind and degree of impact and also affect the possibility of reaching potential forage production.
[b]See Appendix XXII for explanation of how AUMs were estimated and percent of potential was calculated.
[c]AUMs not obligated to livestock indicates the existing forage allocated to wildlife through the Bureau's Multiple Use Planning System (Chapter 1).

(continued)

TABLE 3-10 (continued)

Grazing System or Allotment	Acres	Area Affected	Average Present Situation: Desirable Plant Vigor[a]	Average Present Situation: Apparent Trend	Season of Use	Percent Current Year's Growth Used (Palatable Species)	Resulting Impacts	Length of Impact	Livestock Forage Condition	Apparent Trend	Projected Change in Livestock Forage Production[b] (AUMs)	Percent of Potential in 24 Years	AUMs not Obligated to Livestock[c]	Impact Summary
Rock Springs	820	Total	Same as typical		Summer	Same as typical	Cool season grass, warm season grass - positive impact. Forbs, annual grass, and woody plants - negative impact. Plant composition change - favors increase of perennial grass. Litter accumulation - increase. Riparian vegetation - same as typical.	Long term	Improved	Up	Maintained at 12	100	....	Positive
Sand Hills	992	Total	Same as typical		Same as typical	Same as typical	Same as typical	Long term	Declined	Down	Reduced from 28 to 24	86	....	Negative
Sand Wash Reservoir	640	Total	Same as typical		Same as typical	Same as typical	Same as typical	Long term	Declined	Down	Reduced from 13 to 11	85	....	Negative
Snow Holding Pasture	3,495	Total	Same as typical		Spring	Same as typical	Same as typical	Long	Declined	Down	Reduced from 140 to 119	85	....	Negative
Stout	235	Total	Same as typical		Winter	Same as typical	Cool season grass, warm season grass - positive impact. Forbs, annual grass, and woody plants - negative impact. Plant composition change - favors increase of perennial grass. Litter accumulation - increase. Riparian vegetation - same as typical.	Long term	Improved	Up	Maintained at 2	100	....	Positive

[a]Desirable plant vigor generally applies to most of the allotment that is currently used by livestock although localized exceptions exist. This is a visual observation from one point in time. Vigor estimates were included because they influence the kind and degree of impact and also affect the possibility of reaching potential forage production.
[b]See Appendix XXII for explanation of how AUMs were estimated and percent of potential was calculated.
[c]AUMs not obligated to livestock indicates the existing forage allocated to wildlife through the Bureau's Multiple Use Planning System (Chapter 1).

(continued)

TABLE 3-10 (concluded)

Grazing System or Allotment	Acres	Area Affected	Average Present Situation: Desirable Plant Vigor[a]	Average Present Situation: Apparent Trend	Season of Use	Percent Current Year's Growth Used (Palatable Species)	Resulting Impacts	Length of Impact	Livestock Forage Condition	Apparent Trend	Projected Change in Livestock Forage Production (AUMs)[b]	Percent of Potential in 24 Years	AUMs not Obligated to Livestock[c]	Impact Summary
Virgin Mountain Dell	840	Total	Same as typical		Fall	Same as typical	Cool season grass, and warm season grass - positive impact. Forbs and annual grass, and woody plants - negative impact. Plant composition change - favors increase of perennial grass. Litter accumulation - increase. Riparian vegetation - same as typical.	Long term	Improved	Up	Maintained at 16	100	....	Positive
White Dome	984	Total	Same as typical		Same as typical	Same as typical	Same as typical	Long term	Declined	Down	Reduced from 8 to 7	88	....	Negative
Yellow Knolls	525	Total	Same as typical		Same as typical	Same as typical	Same as typical	Long term	Declined	Down	Reduced from 16 to 14	88	....	Negative
TOTAL	22,537													

[a] Desirable plant vigor generally applies to most of the allotment that is currently used by livestock although localized exceptions exist. This is a visual observation from one point in time. Vigor estimates were included because they influence the kind and degree of impact and also affect the possibility of reaching potential forage production.
[b] See Appendix XXVI for explanation of how AUMs were estimated and percent of potential was calculated.
[c] AUMs not obligated to livestock indicates the existing forage allocated to wildlife through the Bureau's Multiple Use Planning System (Chapter 1).

TABLE 3-11

Impacts on Vegetation: Proposed Elimination of Grazing

Grazing System or Allotment	Acres	Area Affected	Average Present Situation: Desirable Plant Vigor[a]	Average Present Situation: Apparent Trend	Season of Use	Percent Current Year's Growth Used (Palatable Species)	Resulting Impacts	Length of Impact	Livestock Forage Condition	Apparent Trend	Projected Change in Livestock Forage Production[b] (AUMs)	Percent of Potential in 24 Years	AUMs not Obligated to Livestock[c]	Impact Summary
TYPICAL elimination of grazing	......	...	Fair	Static	None	0	Cool season grass, warm season grass, and woody plants - increase in vigor.	....	....	..	....	....	...	....
Pace Knoll[d]	1,885	All	Fair	Static	None	0	Forbs and annual grass - decrease in number.	Long term	*******NO CHANGE********			....	All	No change
Pintura[d] Seeding	904	All	Poor	Static	None	0	Plant composition change - favors natural competitors, perennial grass and browse. Litter accumulation - increase. Riparian vegetation - increase in vigor.	Long term	*******NO CHANGE********			....	All	No change
********************														
LaVerkin Creek	10,716	All	Poor	Static	None	0	Same as typical	Long term	Improved	Up	Increased	....	All	Positive
TOTAL	13,505													

[a]Desirable plant vigor generally applies to most of the allotment that is currently used by livestock although localized exceptions exist. This is a visual observation from one point in time. Vigor estimates were included because they influence the kind and degree of impact and also affect the possibility of reaching potential forage production.

[b]See Appendix XXII for explanation of how AUMs were estimated and percent of potential was calculated.

[c]AUMs not obligated to livestock indicates the existing forage allocated to wildlife through the Bureau's Multiple Use Planning System (Chapter 1).

[d]These two allotments have had no grazing for approximately 10 years; the proposed action would not change conditions indicated above.

<u>Long-Term Impacts on Vegetation</u>. The following is a summary of what would be expected from the proposed grazing management program after 24 years of implementation. Long-term impacts have been evaluated by grazing system; the following table takes into account the accumulative effects of the short-term treatments mentioned above:

Expected Livestock Forage Condition (Acres)		Trend	Production
Improving	473,519	Up	Increasing
Declining	56,045	Down	Decreasing

Expected Attainment of Objectives	
Good possibility	384,508
Poor possibility	145,056

The specific acreage figures were calculated using existing data discussed in Chapter 2 and incorporating impacts as predicted in the previous tables.

<u>Construction Impacts of Proposed Range Developments</u>. Proposed range developments would disturb 5,255 acres of vegetation in the short term. This disturbance would be primarily associated with construction activities, although livestock concentration could cause additional disturbances, e.g., around water facilities. Generally, construction-related disturbances are short term since these areas would be seeded and/or would be subject to natural plant establishment processes. Long-term loss of vegetation from range developments would include the 2,280 acres of unsuccessful seedings in Alger Hollow, Jackson Wash, and Twin Peaks Allotments. Other long-term vegetative loss would be minimal and would be offset by increased utilization of forage and better distribution of livestock. Table 3-12 shows short-term and long-term impacts to vegetation. Appendix XXIII presents a summary by allotment of vegetation affected by proposed range developments.

TABLE 3-12

Impacts to Vegetation from Proposed Developments

Proposed Project	Units	Acres Disturbed Short Term	Acres Disturbed Long Term
Fence	75.2 miles	90.3	0.0
Cattleguards	19 each	0.4	0.4
Pipeline	44.3 miles	44.3	0.0
Wells	2 each	0.5	0.2
Catchments	7 each	7.0	7.0
Reservoirs	8 each	24.0	8.0
Chaining and seedings	5,080 acres	5,080.0	2,280.0
Trails	0.1 mile	0.05	.03
Water tanks	20 each	.4	.4
Springs	18 each	4.5	0.00
		5,251.45	2,296.03

Source: Appendix XXIII

Impacts on Riparian Vegetation by the Proposed Action. In woody riparian plants, food reserves and growing points, which are often located in twigs and stems, are exposed to grazing. Heavily grazing these plants after their food reserves are stored during their dormant period would reduce vigor. This negative impact would be partially offset by the increased rest provided by the proposed action. Herbaceous riparian plants (sedges, rushes, and grasses) would be expected to improve similar to improvement expected for upland herbaceous plants.

Although not grazed as frequently as in the past, riparian areas would be selectively used by livestock and would be used in most cases at a higher intensity. The effect of having more animals in these areas

for shorter periods of time would cause increased intensity of use and physical damage from trampling. Since these areas normally remain green longer than upland vegetation and provide water as well as shade, they would continue to receive concentrated use by livestock although the rest periods would result in an improvement over the existing conditions. Proposed range developments, mainly fences and water, would encourage the use of other areas and would ease some of the grazing pressure on riparian areas.

Riparian areas that are presently being used and are in poor condition, would not improve. These include Bull Mountain, Cougar Canyon, Desert Inn, Gunlock, Grafton, Fort Pierce, Hurricane Fault, Red Cliffs, Scarecrow Peak, and Virgin Allotments and comprise about 53.3 miles. Riparian areas in good condition and presently not being used by livestock would generally not improve under the proposed action.

Impact on Proposed Threatened and Endangered Vegetation. Three of the five proposed threatened and endangered plant species known to be in this general area have been identified in allotments in the Hot Desert area. *Echinocereus engelmannii* var. *purpureus* has been sighted on Alger Hollow and Curly Hollow Allotments. *Arctomecon humilis* was sighted on Curly Hollow and White Dome Allotments. *Pediocactus sileri* is found on the Warner Ridge Allotment. Two of the species are cacti, normally not grazed by livestock. Palatability of the other species for livestock grazing is unknown.

The rest during the growing season, along with the lighter grazing use over present levels of use, would provide these plants with the opportunity to compete with other vegetation. There are no known impacts to threatened and endangered species from proposed range development construction; however, onsite field investigation would be made in those areas of known threatened and endangered habitat prior to construction.

Trailing. The AMPs have identified six allotments (Central, Sand Mountain, White Dome, Herd House, Gunlock, and Curly Hollow) with trailing problems. Trailing would be allowed in accordance with the Virgin River

MFP decisions which limit trailing to designated county roads and established Bureau of Land Management trails, require placing of cattle in holding pens at night, and prohibit drifting of cattle. This would negate present impacts on vegetation from trailing.

WILDLIFE

Introduction. The long-term and short-term wildlife impact summary is shown in table 3-13.

These impacts were predicted from the changes in vegetation discussed in tables 3-5 through 3-11. The "impact summary" noted in table 3-13 addresses both long-term and short-term impacts to the habitat. It summarizes the overall quality of many wildlife factors (cover, food, space, etc.) and considers their importance to the wildlife population itself (Chapter 2). The acres shown in the summary were derived from projecting the distribution of wildlife species (fig. 2-14, 2-15) on the proposed allotment map (fig. 1-2) to determine habitat acreage by allotment. It was not possible to quantify impacts on wildlife populations in each allotment since population estimates are not available by allotment. The importance of each allotment to deer, quail and tortoise is shown in Appendix X.

Mule Deer. Habitat condition for mule deer would improve in five allotments (51,803 acres), decline in 21 allotments (49,483 acres), and remain the same in 19 allotments (178,288 acres). These 45 allotments are those with important or fairly important deer habitat. In allotments where it is predicted that the carrying capacity for deer would decrease or increase, it does not necessarily follow that deer numbers would change from present levels (Appendix II). As stated in Chapter 2, deer herds are presently low and there is more than adequate forage in most allotments for present deer numbers. A conflict between livestock and deer could arise, however, when the deer herds begin to build back up to their potential.

A decline in deer carrying capacity could occur if the proposed action effects a major compositional increase in grasses. However, where grazing systems are designed to favor browse, an increase in palatable browse would also occur in areas grazed by livestock. The vegetation on areas unsuitable for livestock grazing would be affected little by the proposal and most of the forage on these areas would be

available to deer. Because deer would not always confine themselves to these unsuitable areas, competition due to dietary overlap would occur on areas grazed at any time during the year by both deer and livestock.

In 32 allotments, there would be a rested pasture at some time during the grazing season, which would provide forage for deer. Because some deer are very traditional in their use of winter ranges, they may not move to the ungrazed pastures and take advantage of additional forage. This could result in competition in the areas grazed by livestock.

The proposed Little Creek Mountain chaining would release desirable understory shrubs and increase forb and grass production. The proposed irregular chaining patterns would increase the "edge effect" which is beneficial to deer as well as small mammals and birds. This dense pinyon-juniper area presently receives light use by these animals and this development would enhance their habitat.

It is generally agreed that if deer use does increase following a chaining, such use is concentrated along the edge of the treatment (McCullough 1969, Minnich 1969, Cole 1968). Deer use decreases as the distance from the edge increases. Urness (1966) reported a marked increase in pellet group counts within 100 feet of the edge of the treatment. In the proposed chainings of 1,300 and 500 acres on Little Creek Mountain, it is not expected that deer would make use of the entire seedings, but would mainly benefit from increased production along the edge. If islands of cover were left untreated and with an irregular pattern, the entire seedings would be potentially productive and available to deer.

The other three proposed vegetative treatments - Alger Hollow, Jackson Wash and Twin Peaks - have low chances of success according to soils analysis (table 3-4). If not successful, these treatments could reduce desirable food and cover from present levels.

Deer are not inclined to travel more than approximately 1.5 miles to water (Hanson and McCulloch, 1955). Of the 125 proposed water developments, 83 are in deer areas and would enhance deer and other

wildlife habitat in the long term. New water developments in areas that have sufficient forage may open up additional areas for deer utilization.

Fences would be built according to Bureau of Land Management manual specifications to allow for passage of wildlife, so wildlife movement would generally not be restricted. But some deer loss would still occur because of the proposed 43 additional miles of fence in deer habitat. This loss would not be noticeable in the total deer population.

Quail. The predicted decline or improvement in quail habitat was based on the decrease or increase of annuals and forbs in the vegetative composition, the impact on riparian vegetation, and the impact on cover. Estimated vegetative changes due to the proposed action are shown in table 3-13. Quail habitat would improve in five allotments (33,818 acres), decline in 14 allotments (48,409 acres), and remain the same in 22 allotments (240,164 acres). These 41 allotments have important or fairly important quail habitat. However, in unusually dry years, a decrease in forbs and annuals would have a greater adverse impact on quail, especially in the pastures receiving heavy spring use. Quail reproduction may be limited by this shortage of green succulent vegetation brought on by climatic conditions, but intensified by spring grazing (Hungerford 1960). In the long term, quail numbers are not expected to change. Localized situations would arise where impacts of increased cover would be offset by decreased annuals and forbs.

In areas where water is lacking, quail select a higher percentage of succulent green food material, while in areas nearer to water, dry seeds provide the bulk of their food (Hungerford, 1960). Cattle tend to concentrate their utilization around water sources, thus removing vegetation in areas where quail also tend to concentrate. On most allotments, rest periods have been increased over the present situation and competition would be limited. Development of 60 new water sources in quail areas would make it possible for quail to utilize more dry seeds. In areas with little water where cattle still graze, competition for green food could occur. However, this competition would be minimized in years when pastures are rested. In years when pastures are grazed, it

is doubtful whether quail would take advantage of the rested pastures in all cases, and competition could occur.

Other Wildlife. The impact of the proposed action on any future bighorn sheep transplants would be slight because sheep usually confine themselves to the areas unsuitable for livestock and forage condition would not be impacted. There would be no development of water for livestock in the bighorn sheep area in order to lessen the opportunity for interaction.

Small mammals and birds would most likely benefit from the increased cover and food from perennial grasses and shrubs. In areas where the riparian vegetation improves, small mammals and birds would benefit. Those areas of riparian habitat that continue to remain static or decline would not provide additional cover or food for small mammals and birds. Generally, loss or gain of woody plants affect the cover and herbaceous plants affect the food for small animals. During the spring grazing of pastures, suitable nesting sites may be reduced in some areas by the removal of vegetation (Buttery and Shields, 1975). Most song birds are territorial and would not move to rested pastures where suitable nest sites would already be occupied.

The impacts on raptors would generally depend on the effects on their prey species, mainly small mammals and birds. Diversity in vegetation on ranges in good condition usually produces a greater abundance and variety of prey species, thereby attracting a greater number of raptors. Those 21 allotments predicted to have a downward range trend and reduced production could become less desirable for raptors. Conversely, those allotments with an expected increase in cover and an improved range condition would improve available food supply for raptors.

Fences have little or no detrimental effect on bird habitat, and may, in fact, improve it by providing hunting perches for raptors, flycatchers and shrikes, and safer resting areas for other birds, particularly where shrubs are scarce.

Water developments can be both beneficial and detrimental to bird habitat. The most detrimental effect to birds would be the resulting

concentration of animals in the vicinity of the water development. Ground cover and nesting habitat on approximately 125 acres could be damaged or destroyed by grazing and trampling. However, because water is currently a limiting factor for many of the area's wildlife, they would mostly benefit from the 125 new water developments. Mourning dove distribution would also benefit from additional water. Other possible beneficial effects might be an increase in numbers and species of insects used for food attracted by the water, livestock and manure, and the creation of dusting areas.

Cover for waterfowl may be adversely impacted by the loss of riparian habitat in those allotments where it is presently declining and would continue to decline. There may be no change over the present situation in some allotments. In areas with established shoreline vegetation that is presently in good condition, the proposed action may improve habitat for waterfowl, particularly in those years when the vegetation is rested or grazed early. Gjersing (1975) cites the benefit of increased vegetation resulting from a grazing management system which would provide additional nesting and/or brood-rearing habitat.

Reptiles and amphibians may lose some habitat and shade where the riparian vegetation declines. Busack and Bury (1973) indicated in their study of insectivorous lizards that grazing has a negative effect on these animals due to loss of cover, reduction in invertebrate food sources, disturbance of social structure, and casualties. This impact would occur in those 21 allotments in which the production would decrease and the range trend would decline, while the rested pastures in 42 allotments would provide additional food and cover for these animals.

Desert Tortoise. Table 3-13 predicts an increase in perennial grasses, but it is unknown whether the expected increase would be timely enough to benefit the present declining tortoise population.

The proposed grazing system for the Beaver Dam Slope Allotment would result in competition for annual spring forage between cattle and tortoises during the year of spring grazing (Kristin Berry 1976, Division of Wildlife Resources 1976: personal communication). The pressure

on annuals resulting from competition between tortoise and cattle would be alleviated somewhat by the MFP decision (table 1-1) and by restricting cattle use as outlined in the AMP 2 out of 3 years. However, in areas of heavy tortoise concentration - primarily washes - (fig. 2-15), competition for succulent forage between cattle and tortoise would still occur 1 year out of 3. This competition would be more intense during dry years. The Beaver Dam Slope Allotment Management Plan objective did not determine total annual production and set no limits to the amount actually utilized by cattle. This would be necessary to insure that sufficient annual forage is available to the tortoise.

The proposed action would adversely impact the home range behavior of the tortoise. Tortoises would not move into another ungrazed pasture or travel to other areas when the food supply is poor or has been exhausted by cattle. If tortoises did move, they would enter home ranges of others and territorial conflicts would likely increase. Since females are the least mobile and the young have the smallest home ranges, they would be impacted the most severely by the competition for food (Kristin Berry 1976: personal communication).

This competition for forage would be extremely important to the 250 to 300 tortoises remaining on the west side of the highway on the Beaver Dam Slope since the major reason for their continuing decline is thought to be a nutritional problem leading to a lack of reproduction (Kristin Berry 1976: personal communication).

Threatened or Endangered Species

Peregrine Falcon. Since the only known active nest in this region is not on public land, and the major hunting area of the falcons is not within the ES boundary, no impacts on this species can be identified.

TABLE 3-13

Impact Summary on Key Wildlife Species

Allotment	Total Acres	Cause	Length of Impact	Impacts	Long-Term Impact Summary (acres) Deer Habitat	Quail Habitat	Tortoise Habitat
Alger Hollow	23,780	When grazed, 75% current growth used; fall/winter/spring season of use	Short term	When pastures are grazed, competition with deer for browse would increase; competition with quail for spring annuals and forbs would increase	....	....	....
		No change in browse	Long term	No impact on deer	Important; no change 11,890	Important; no change 17,835	Important; no change 2,000
		Decrease in annuals; increase in cover	Long term	No impact on quail; benefit of increased cover offset by decrease in annuals; tortoise area receives no livestock use because of inaccessibility			
Apex Slope Winter Pastures	2,986	Pastures grazed at nearly 3 times the proper carrying capacity; browse hit extremely heavy	Short term	When pastures are grazed, competition with deer for browse would increase	....	....	....
		Decrease in browse	Long term	Lower capacity for deer	Fair importance; decline 1,000	Important; decline 2,986	None
		Decrease in cover; reduced production; downward range trend	Long term	Decline in habitat for quail, small mammals and birds			
Spring Pastures	2,893	Heavy use on forbs, spring use	Short term	When pastures are grazed, competition with quail and deer for forbs would increase	....	....	....
		Decrease in browse	Long term	Lower carrying capacity for deer	Fair importance; decline 1,000	Important; decline 2,893	None
		Decrease in cover; reduced production; downward range trend	Long term	Decline in habitat for quail, small mammals and birds			
Beaver Dam Slope	68,490	When grazed, 75% current growth used; spring use	Short term	When pastures are spring grazed, competition with quail and tortoises for annuals and grass would increase in areas of tortoise-livestock concentration	....	....	....

(continued)

TABLE 3-13 (continued)

Allotment	Total Acres	Cause	Length of Impact	Impacts	Long-Term Impact Summary (acres) Deer Habitat	Quail Habitat	Tortoise Habitat
Beaver Dam Slope (continued)		Increase in cover; decrease in annuals	Long term	No impact on quail; benefit of increased cover offset by decrease in annuals	Fair importance; no change 23,287	Important; no change 68,490	Critical; decline 5,120
		No change in browse Slower than typical increase of perennial grass	Long term Long term	No impact on deer Expected increase of perennial grass may not occur soon enough to be of any benefit; decline in critical habitat areas of tortoise and livestock concentrations			
Big Mountain	9,126	No present conflict with deer; sufficient forage reserved for deer; no winter use	Short term	No competition with deer for browse	....	....	....
		Despite predicted decline in browse, sufficient forage would remain	Long term	No impact on deer	Important; no change 9,126	Insignificant; no change 0	None
		No change in riparian areas	Long term	No change in habitat for small mammals and birds			
Boomer Hill	4,327	Very heavy use 1 year out of 2	Short term	When pastures are grazed, competition with deer for browse would increase	....	....	....
		Decrease in browse	Long term	Lower carrying capacity for deer	Fair importance; decline 1,428	Important; improved 4,327	None
		Increase in cover; no change in annuals	Long term	Beneficial impact on quail			
Boot Spring	2,118	Increase in cover; no change in annuals	Short term/ Long term	Beneficial impact on quail	Insignificant; no change 0	Fair importance; improved 2,118	None
Bull Mountain	14,519	Large area unsuitable with sufficient forage for deer	Short term/ Long term	No competition with deer for browse	Important; no change 14,374	Fair importance; decline 804	None
		Presently not grazed; decline in riparian areas	Short term/ Long term	Decline in habitat for quail, small mammals and birds, reptiles and amphibians in riparian areas			

(continued)

TABLE 3-13 (continued)

Allotment	Total Acres	Cause	Length of Impact	Impacts	Long-Term Impact Summary (acres) Deer Habitat	Quail Habitat	Tortoise Habitat
Central	2,920	Presently no conflicts with deer; sufficient forage available; no change in browse	Short term/ Long term	No impact on deer	Important; no change 2,920	Insignificant no change 0	None
		Decrease in annuals; increase in cover; no change in riparian areas	Short term Long term	No change in habitat for quail, small mammals and birds; benefit of increased cover offset by decrease in annuals and forbs for quail			
Coalpits	2,525	Increase in unpalatables and annuals; decrease in browse	Short term/ Long term	Lower carrying capacity for deer	Critical; decline 2,525	Insignificant; no change 0	None
Cougar Canyon	9,150	Sufficient forage reserved for wildlife; no winter use	Short term	No conflicts with deer	....	....	....
		Despite decline in browse, sufficient forage would remain	Long term	No impact on deer	Important; no change 9,150	Insignificant; no change 0	None
Curly Hollow (Grazing System)	21,562	No present conflict with deer	Short term	No competition with deer	....	....	....
		Heavy use of annuals during spring grazing	Short term	Increase in competition with quail for forbs	....	....	....
		Maintain browse; favor palatable species	Long term	Maintain carrying capacity for deer	Fair importance; improved 21,562	Important; no change 21,562	None
		Decline in annuals; increase in cover; no change in riparian areas	Long term	No change in habitat for quail, small mammals and birds in riparian areas; benefit of increased cover offset by decline of annuals and forbs for quail			
Curly Hollow (Holding Pasture)	1,410	Decline in palatable vegetation; decreased production and downward range trend decline in browse	Long term	Lower carrying capacity for deer and habitat for small mammals and birds would be reduced	Fair importance; decline 1,410	Important; decline 1,410	....
Dagget Flat	**4,127**	When grazed, over 90% of current growth utilized; summer/fall season of use; heavy use on introduced grasses and palatable browse	Short term	When pastures are grazed, increased severe competition with deer for browse, forbs, and grass; reduced reproduction	....	....	....
		Increase in unpalatables and annuals; decrease in browse; decline in range trend; reduced production	Long term	Lower carrying capacity for deer, both summer and winter range; decline in habitat for small mammals and birds	Critical; decline 4,127	Insignificant; no change 0	None

(continued)

TABLE 3-13 (continued)

Allotment	Total Acres	Cause	Length of Impact	Impacts	Long-Term Impact Summary (acres) Deer Habitat	Quail Habitat	Tortoise Habitat
Desert Inn	36,983	Abundant browse spread over large area	Short term	No conflict with deer	....	....	....
		Heavy use on annuals and forbs during spring	Short term	When pastures are grazed, increase in competition with quail	....	....	....
		No change in browse	Long term	No impact on deer	Important; no change 29,586	Fair importance; no change 12,574	None
		Decrease in annuals; decline in riparian	Long term	Decline in habitat for quail, small mammals and birds in riparian areas;			
Dome	3,068	Spring use heavy on annuals and forbs	Short term	When pastures are grazed, competition with quail for forbs will increase	....	....	....
		Increase in cover; slow decrease in annuals	Long term	Beneficial impact on quail; even though annuals would decrease, it would happen slowly, offset by increase in cover	Insignificant; no change 0	Fair importance; improved 3,068	None
Fort Pierce	30,681	Continued decline of riparian areas due to physical damage	Short term/ Long term	Decline of habitat for quail, small mammals and birds, reptiles and amphibians in riparian areas	Insignificant; no change 0	Important; decline 108	None
Gooseberry	4,440	No present conflicts with wildlife	Short term Long term	No increase in competition over	Important; no change 4,440	Insignificant; no change 0	None
Grafton	7,258	When grazed, 75% of current desirable plant growth used; fall/winter/spring season of use	Short term	When pastures are grazed, competition with deer for browse would increase. Competition with quail for forbs would increase	....	....	....
		No change in browse	Long term	No impact on deer	Important; no change 726	Fair importance; no change 7,258	None
		Decrease in annuals; increase in cover	Long term	Decline in habitat for small mammals and birds; benefit of increased cover offset by decrease in annuals for quail			
		Decrease in browse forbs; decline in riparian areas due to physical damage	Long term	Lower carrying capacity for deer mammals and birds, reptiles and amphibians in riparian areas			
Gunlock	6,334	Sufficient forage reserved for wildlife	Short term	No conflict with deer or quail	....	....	....
		Decrease in browse	Long term	Lower carrying capacity for deer	Important; decline 6,334	Important; decline 6,334	None
		Decrease in annuals and forbs; decline in riparian areas due to physical damage	Long term	Decline in habitat for quail, small mammals and birds, reptiles and amphibians in riparian areas			

(continued)

TABLE 3-13 (continued)

Allotment	Total Acres	Cause	Length of Impact	Impacts	Long-Term Impact Summary (acres) Deer Habitat	Quail Habitat	Tortoise Habitat
Herd House	2,390	Decrease in forbs and annuals; increase in cover	Short term/ Long term	No impact on quail; benefit of increased cover offset by decreased forbs and annuals	Insignificant; no change 0	Fair importance; no change 2,390	None
Hurricane	1,910	Increase in cover; decrease in annuals and forbs	Short term Long term	No impact on quail; benefit of increased cover offset by decrease in annuals and forbs	Insignificant; no change 0	Important; no change 1,910	None
Hurricane Fault	19,426	Deer found in rough, unsuitable area; no present conflict with deer	Short term	No competition with deer	....	....	....
		Spring use	Short term	When pastures are grazed, increase in competition with quail for forbs	....	....	....
		Increased cover; decrease in annuals; decline in riparian vegetation along wash	Long term	Decline in habitat for small mammals and birds in riparian areas; benefit of increased cover offset by decreased forbs and annuals for quail	Insignificant no change	Important; no change 19,426	None
Hurricane Mesa (grazing system)	3,290	Sufficient forage reserved for wildlife including private grain fields	Short term	Competition with deer reduced from present	....	....	....
		Improvement in browse	Long term	No competition with deer	Critical; improved 3,290	Insignificant; no change 0	None
Jackson Wash	28,680	When grazed, over 80% of current growth used; fall winter spring season of use	Short term	When pastures are grazed, competition with deer for browse would increase; competition with quail for forbs would increase	....	....	....
		Increase in unpalatables and annuals; decline in browse; downward range trend; decreased cover; reduced production	Long term	Lower carrying capacity for deer decline in habitat for quail small mammals and birds.	Important; decline 19,216	Important; decline 28,680	None
Land Hill	1,030	Winter use; decrease in browse; decrease in annuals and forbs; increase in cover	Short term/ Long term	Lower potential carrying capacity for deer; no impact on quail; benefit of increased cover offset by decrease in annuals and forbs	Fair importance; decline 105	Important; no change 1,030	None
Little Creek Mountain	14,595	Presently no competition with deer; adequate forage	Short term/ Long term	No competition with deer	Important; improved 14,595	Insignificant; no change 0	None
		Seeding would increase interspersion of food and cover for deer, small mammals, and birds	Long term	Beneficial impact on these species			

(continued)

TABLE 3-13 (continued)

Allotment	Total Acres	Cause	Length of Impact	Impacts	Long-Term Impact Summary (acres) Deer Habitat	Quail Habitat	Tortoise Habitat
Mesa (grazing system)	1,640	Winter use	Short term	When pastures are grazed, competition with deer for browse would increase	Important; improved 1,640	Insignificant no change 0	None
		Improvement in browse	Long term	Improve carrying capacity for deer	....	....	....
Minera Wash	4,637	Presently no competition with deer; sufficient forage reserved for wildlife; no change in browse; increased cover; decrease in annuals	Short term/ Long term	No impact on deer; no impact on quail; benefit of cover offset by decrease in annuals	Important; no change 4,637	Fair importance; no change 3,478	None
Red Cliffs	13,557	When grazed, 75% current desirable growth used; fall/winter/spring season of use	Short term	When pastures are grazed, competition with deer for browse would increase; competition with quail for spring forbs would increase. Increased cover offsets decrease in annualist forbs.	....	....	....
		No change in browse	Long term	No impact on deer	Important; no change 6,978	Important; decline 12,165	None
		Decrease in annuals; decline in riparian areas due to physical damage	Long term	Decline in habitat for quail, small mammals and birds, reptiles and amphibians in riparian areas			
Sand Mountain	21,085	Increased cover; decrease in annuals and forbs	Short term/ Long term	Beneficial impact on quail; even with a decrease in annuals, sufficient forage would be left	Insignificant; no change 0	Important; improved 21,085	None
Sandstone Mountain	2,531	When grazed, 35% current growth used	Short term	No competition with quail for forbs	....	....	....
		Increase in cover; decrease in annuals	Long term	No impact on quail; benefit of cover offset by decrease in annuals	Insignificant; no change 0	Important; no change 2,531	None
Santa Clara Creek	3,038	Decrease in browse and annuals; decline in riparian areas; increase in cover	Short term/ Long term	Lower carrying capacity for deer; decline in habitat for quail, small mammals and birds in riparian areas; benefit of increased cover offset by decrease in annuals and forbs for quail	Fair importance; decline 304	Important; no change 3,038	None
Scarecrow Peak	40,622	When grazed, over 80% of current growth used; fall/winter/spring season of use	Short term	When pastures are being grazed, increase in competition with deer for browse; increase in competition with quail for forbs	....	....	....
		No change in browse	Long term	No impact on deer	Insignificant no change	Important; no change 40,622	None
		Decline in riparian areas; decrease in annuals and forbs; increase in cover	Long term	Decline in habitat for quail, small mammals and birds in riparian areas; benefit of increased cover offset by decrease in annuals and forbs for quail			

(continued)

TABLE 3-13 (continued)

Allotment	Total Acres	Cause	Length of Impact	Impacts	Long-Term Impact Summary (acres) Deer Habitat	Quail Habitat	Tortoise Habitat
Short Creek	5,180	No present conflict with deer; deer found in rough, unsuitable areas	Short term	No increase in competition with deer	....	....	....
		Heavy use on annuals and forbs; spring use	Short term	When pastures are grazed, competition with quail for forbs would increase	....	....	....
		No change in browse	Long term	No impact on deer	Fair importance; no change 5,180	Important; no change 5,180	None
		Decrease in annuals and forbs	Long term	No change in habitat for quail, small birds and mammals in riparian areas; benefit of increased cover offset by decrease in annuals and forbs for quail			
Smith Mesa	1,940	Yearlong use; browse already in overused condition	Short term	Competition with deer for browse would continue	....	....	....
		Decline in browse vigor and production	Long term	Lower carrying capacity for deer	Critical; decline 1,940	Insignificant; no change 0	None
Toquerville	11,075	Sufficient forage for deer	Short term	No competition with deer	....	....	....
		No change in browse	Long term	No impact on deer	Critical; no change 11,075	Fair importance; no change 1,000	None
		No change in riparian areas; decrease in annuals; increase in cover	Long term	No change in habitat for quail, small mammals and birds in riparian areas; benefit of increased cover offset by decrease in annuals and forbs for quail			
Trail	3,220	Sufficient forage reserved for wildlife; no present conflicts with deer	Short term	No competition with deer	....	....	....
		Despite predicted decline in browse, still sufficient to support deer using this allotment	Long term	No impact on deer	Insignificant no change 0	Fair importance; improved 3,220	None
		No change in annuals; increase in cover	Long term	Beneficial impact on quail			
Twin Peaks	28,836	No present conflict with deer; adequate forage available	Short term	No competition with deer	....	....	....

(continued)

TABLE 3-13 (continued)

Allotment	Total Acres	Cause	Length of Impact	Impacts	Long-Term Impact Summary (acres) Deer Habitat	Quail Habitat	Tortoise Habitat
Twin Peaks (continued)		Spring use	Short term	When pastures are spring grazed, competiton with quail for forbs would increase	....	....	....
		No change in browse	Long term	No impact on deer	Important; no change 28,836	Fair importance; no change 14,418	None
		Decrease in annuals; increase in cover	Long term	No impact on quail; benefit of increased cover offset by decrease in annuals			
Veyo	8,056	When grazed, 75% current growth used; fall/winter/spring season of use	Short term	When pastures are grazed, competition with deer for browse would increase; competition with quail for forbs would increase	....	....	....
		No change in browse	Long term	No impact on deer	Important; no change 8,056	Fair importance; no change 5,397	None
		Decrease in annuals; increase in cover	Long term	No impact on quail; benefit of cover offset by decrease in annuals			
Virgin	5,650	No change in browse	Long term	No impact on deer	Critical; no change 4,238	Important; decline 1,413	None
		Decline of riparian areas; decrease in annuals	Long term	Decline of habitat for quail, small mammals and birds, reptiles and amphibians in riparian areas			
Warner Ridge	1,884	No present conflict with deer or quail; when grazed, only 35% current growth used	Short term/ Long term	No impact on wildlife	Insignificant; no change 0	Insignificant; no change 1,884	None
Washington	9,765	Sufficient forage reserved for wildlife; no present conflicts with wildlife	Short term/ Long term	No impact on wildlife	Fair importance; no change 1,000	Fair importance; no change 7,812	None
White Dome	1,523	Decrease in annuals and forbs; increase in cover	Short term/ Long term	No impact on quail; benefit of increased cover offset by decrease in annuals and forbs	Insignificant; no change 0	Important; no change 1,523	None
CUSTODIAL							
Airport	147	Increase in annuals and forbs; decrease in cover	Short term/ Long term	No impact on quail; benefit of increased annuals offset by decrease in cover	Insignificant; no change 0	Fair importance; no change 147	None

(continued)

TABLE 3-13 (continued)

Allotment	Total Acres	Cause	Length of Impact	Impacts	Long-Term Impact Summary (acres) Deer Habitat	Quail Habitat	Tortoise Habitat
Black Canyon	600	Increase in unpalatables and annuals; decline in range trend; reduced production; decrease in browse	Long term	Lower carrying capacity for deer	Critical; decline 600	Insignificant; no change 0	None
Box Canyon	659	Increase in annuals; decrease in cover	Short term/ Long term	No impact on quail; benefit of increased annuals offset by decrease in cover	Insignificant; no change 0	Fair importance; no change 659	None
Cinder Mountain	2,240	No present conflicts with wildlife	Short term/ Long term	No impacts on deer or quail	Insignificant; no change 0	Insignificant; no change 0	None
Dalton Wash	855	Decrease in browse	Short term/ Long term	Lower carrying capacity for deer	Critical; decline 855	Insignificant; no change 0	None
Fault	785	No present conflicts with wildlife	Short term/ Long term	No impacts on deer or quail	Insignificant; no change 0	Insignificant; no change 0	None
Herd House	480	Decrease in cover; downward range trend; reduced production	Short term/ Long term	Decline in habitat for quail, small mammals and birds	Insignificant; no change 0	Fair importance; decline 480	None
Hurricane	160	Decrease in cover; downward range trend; reduced production	Short term/ Long term	Decline in habitat for quail, small mammals and birds	Insignificant; no change 0	Important; decline 160	None
Hurricane Mesa	3,521	Heavy yearlong use; browse already in poor vigor	Short term	Competition with deer for browse would continue	....	....	....
		Decrease in browse; reduced production; downward range trend	Long term	Lower capacity for deer	Critical; decline 350	Insignificant; no change 0	None
Lamoreaux	160	Increase in unpalatables and annuals, decline in browse; downward range trend; reduced production	Short term/ Long term	Lower carrying capacity for deer	Critical; decline 160	Insignificant; no change 0	None
Little Plain	930	No present conflict with wildlife	Short term/ Long term	No impacts on deer or quail	Insignificant; no change 0	Insignificant no change 0	None
Mesa	940	Decrease of browse; downward range trend; reduced production	Short term/ Long term	Lower carrying capacity for deer	Important; decline 940	Insignificant; no change 0	None
North Grafton	500	Decrease in browse; downward range trend; reduced production	Short term/ Long term	Lower carrying capacity for deer	Critical; decline 500	Insignificant; no change 0	None

(continued)

TABLE 3-13 (concluded)

Allotment	Total Acres	Cause	Length of Impact	Impacts	Long-Term Impact Summary (acres) Deer Habitat	Quail Habitat	Tortoise Habitat
Red Butte	894	Decrease in browse; downward range trend; reduced production	Short term/ Long term	Lower carrying capacity for deer deer	Critical; decline 894	Insignificant; no change 0	None
Rock Spring	820	Decrease in browse	Short term/ Long term	Lower carrying capacity for deer	Critical; decline 820	Insignificant; no change 0	None
Sand Hills	992	Decreased cover; reduced production; downward range trend	Short term/ Long term	Decline in habitat for quail, small mammals and birds	Insignificant; no change 0	Important; decline 992	None
Sand Wash Reservoir	640	Decrease in browse; downward range trend; reduced production; decrease in cover	Short term/ Long term	Lower carrying capacity for deer decline in habitat for quail, small mammals and birds	Important; decline 640	Fair importance; decline 640	None
Snow Holding Pasture	3,495	Decrease in browse; reduced production; downward range trend	Short term/ Long term	Lower carrying capacity for deer	Important; decline 3,495	Insignificant; no change 0	None
Stout	235	No present conflicts with wildlife	Short term/ Long term	No impacts on deer or quail	Insignificant; no change 0	Insignificant; no change 0	None
Virgin	840	Decrease of browse; decrease in annuals; decline of riparian areas	Short term/ Long term	Lower capacity for deer	Critical; decline 840	Insignificant; decline No Change	None
White Dome	984	Downward range trend; decrease in cover; reduced production	Short term/ Long term	Decline in habitat for quail, small mammals and birds	Insignificant; no change 0	Important; decline 984	None
Yellow Knolls	525	Decrease in cover; downward range trend; reduced production	Short term/ Long term	Decline in habitat for quail, small mammals and birds	Insigificant; no change 0	Fair importance; decline 525	None
ELIMINATION OF GRAZING							
LaVerkin Creek	10,716	Improvement in browse, cover and riparian areas	Long term	Beneficial impact on deer, small mammals and birds, reptiles and amphibians; additional 41 AUMs available for wildlife	Critical; improved 10,716	Insignificant; no change 0	None
Pace Knoll	1,885	No change		Beneficial to deer, small mammals and birds	Fair importance; no change 1,885	Insignificant; no change	None
Pintura Seeding	904	No change		Beneficial to deer, small mammals and birds	Critical; no change 904	Insignificant; no change	None

WATER RESOURCES AND FISHERIES

Water. Implementation of the proposed management plans would produce little change in existing water resources.

The water consumptively used for livestock grazing would not change, although new water developments would distribute the water needs more evenly over the available supply. Livestock and wildlife use of water generally does not conflict with other uses and livestock use with the proposed action would only constitute 0.008 percent of the total available water.

With implementation of the management plans, short-term surface erosion would decrease on 63 percent of the public land, and increase on 33 percent. In the long term, the surface erosion is expected to decrease on 83 percent of the public land and increase on 4 percent. The long-term decline would be expected to be 10 to 20 percent (see Soils section). The sediment loads in the streams would not decline as much as the surface erosion since a major contributing factor is erosion of stream banks and immediately adjacent riparian areas. Since the change in riparian vegetation would be small (see Vegetation section), the reduction in erosion would likewise be small. Some changes would occur in sediment loads in streams, but it is estimated that it would be less than 10 percent of current levels. The greatest anticipated change would be in Bull Mountain Allotment, where the increase would be greater than 10 percent. This would be due to the grazing in the upper two proposed pastures where livestock have not been grazing in the past. These pastures are presently in excellent condition due to the lack of livestock use. In LaVerkin Creek, there would be a decrease of 10 to 20 percent or more due to the elimination of livestock grazing.

Chemical constituents are not likely to change since the chemical composition is dependent to a large extent on source of water and the geological substrate. Changes in erosion would not be great enough to produce a noticeable change in the chemical composition of the water. During periods of use, coliform levels would be essentially the same as

at present. Most coliform contamination from livestock comes from use in or directly adjacent to the stream, so that downstream coliform levels would increase during periods of grazing, followed by a decline when livestock are removed, but with coliform counts similar to what are presently occurring.

Fisheries Introduction. The level and detail of impact assessment are limited by two considerations. First, adequate site specific fisheries' data (habitat, species, and populations) are not available to assess either site specific positive or negative impacts. Second, applicable studies that are useful in assessing site specific impacts to fisheries habitat and populations are limited. There are no available studies which document impacts from all of the various grazing systems proposed in the Hot Desert area. Some data are available on impacts from rest-rotation grazing (Platts and Rountree, 1972; Eckhart, 1975).

For the above reasons, the following analysis is generalized, and not site specific by allotment or stream. Documented study results and conclusions of a general nature are used where applicable. Some of the following analysis is based upon professional judgment utilizing experience gained from field observations of historical grazing patterns and similar grazing management systems implemented in other areas on public lands.

The impact analysis deals with two major factors: grazing effects on riparian vegetation and physical (soil) impacts caused by livestock concentration and subsequent trampling along stream banks.

As an introduction to the analysis, a brief discussion on the historical patterns of livestock grazing is provided by Ames (1977):

> "Cattle exhibit a strong preference for the riparian zones for a number of reasons. Cattle prefer the quality and variety of forage available. Riparian forage is higher in palatability because it has more moisture in it whether it be shrubs, forbs, or grass. Moisture content, probably more than any other factor, influences palatability. A preferred species of forage growing on a dry hillside will not be nearly as palatable as the same species growing in a riparian zone.

> Availability of water in most riparian areas provides a strong influence for livestock to frequent the area.
>
> If the surrounding country is rough and rocky, livestock tend to concentrate along the riparian areas just to give their feet a rest. In hot climates, livestock seek the shade available along the riparian areas. In cold climates, they seek shelter from the cold winds."

<u>Grazing Effects on Riparian Vegetation</u>. Site specific grazing systems designed to improve the conditions of range plants are not normally tailored to the physiological requirements of woody riparian plants. The success of a rest-rotation system in improving range vegetation does not guarantee that riparian plants bordering a stream within pastures of the system would be maintained. Results of rest rotation on riparian vegetation range widely from positive to negative. Each case is unique and must be evaluated separately.

Generally, riparian vegetation begins growth earlier in the spring and continues growth later into the fall than most upland range plants. During this time, the plants are more palatable than dried range plants and are actively sought by cattle (Platts and Rountree, 1972). Because of this, riparian vegetation in meadows and stream bottoms is invariably closely utilized under any stocking rate or system of grazing (Hormay, 1976).

Two studies conducted by Platts and Rountree (1972) and Eckert (1975) question whether riparian vegetation can be restored on previously overgrazed pastures through the use of rest-rotation grazing management systems. These authors concluded that riparian vegetation receiving 1 year of rest in a rest-rotation system did not recover adequately. Thus, their findings seemed to indicate pastures may recover during a yearlong rest, but stream banks do not recover adequately.

<u>Nature of Impacts</u>. In the impact assessment on fisheries' habitat, various components of the proposed action need to be examined. The primary cause of an impact would be physical damage associated with the removal of stream bank vegetation, stream bank soil instability resulting from livestock concentration, and trampling.

From a fishery habitat standpoint, positive effects of rest periods and the subsequent increase in ground cover of riparian vegetation could have little effect on the overall stability or productivity of the aquatic ecosystem. Since grazing sequences would follow the rest periods, removal of vegetation and physical disturbance of the stream habitat would negate any positive benefits derived from the rest (Platts and Rountree, 1972; Eckert, 1975).

A number of studies (Marcuson, 1970 etc.) have shown that fish production is much lower where grazing occurs in the riparian zone. Behnke (1977) indicates, ". . . the focal point of conflict concerns the fact the livestock tend to concentrate along stream bottoms leading to excessive use and eventual destruction of riparian vegetation, which in turn leads to destabilized stream banks and altered stream channels". Further confirmation that shallow, high-velocity flows without suitable cover hold considerably less biomass of trout (especially less of the older, larger fish) and that this difference is due to differences in the physical habitat, not the food supply, was demonstrated by the experimental alteration of a section of Lawrence Creek, Wisconsin (Hunt, 1969, 1976). The works of White (1973) and Wesche (1973, 1974) also document the relationships of channel morphology, undercut banks, and adequate cover to trout abundance. While these factors would tend to occur within or near the stream itself, additional effects from grazing on the surrounding soils and vegetation within the watershed could also influence the type and degree of impact that would occur.

Summary. Specific impacts to fisheries' habitat in the Hot Desert would depend on the existing condition and stability, intensity and frequency of grazing, amount of rest, and impacts to soils and vegetation in the riparian zone itself and surrounding watershed.

Impacts to fishes would depend on the extent to which their habitat was modified from its existing condition. In addition, their specific tolerance to the modification and their viability in terms of reproductive capability would influence the type and degree of impact.

There are insufficient data on the effect the reduction of livestock numbers and periods of rest would have on the woundfin, Virgin River roundtail chub, and the Virgin River spinedace to make a determination of impacts. In compliance with Chapter 1, design restrictions and BLM policy (Manual Section 6840), necessary data would be collected prior to making any decisions that may affect this species. If it is determined that the proposed action may adversely affect these species, formal consultation with the Fish and Wildlife Service would be initiated in accordance with section 402.04 of the regulations implementing Section 7 of the Endangered Species Act.

Because of these variables, a reliable and accurate impact assessment in more specific terms would be beyond the scope of this statement. As a result, a monitoring and mitigation program would be developed as discussed in Chapter 4.

CULTURAL RESOURCES

The effect of the proposed action on cultural resources is dependent upon the significance and type of site, as well as anticipated disturbance.

Implementation of the proposed Allotment Management Plans could adversely affect cultural resources through surface disturbances incurred during construction of the proposed range developments. However, archaeological clearance would be required prior to construction (Chapter 1). Cattle trampling is not generally an adverse impact to cultural resources, unless a large number of cattle are concentrated in the area of a site, such as at springs, salt licks, and trail routes where resources are exposed. Since cattle presently graze the area, no additional cattle-related impacts are anticipated.

There are 15 recorded sites known to be in the proposed construction areas. These sites are listed in Appendix XXIV. None of the areas proposed for construction of range developments has had a complete archaeological survey because the precise location of many range developments has not been determined yet.

Heavy machinery traversing a site disturbs, and sometimes obliterates the horizontal surface manifestations of the site by breaking and scattering artifacts and by destroying the existing features and structures. Machinery digging into a site not only disturbs the horizontal surface, but also disturbs and destroys the vertical strata of cultural and paleoecological deposition.

Heavy cattle trampling also has the effect of breaking and scattering artifacts, of knocking over structures when they rub up against the walls, and of destroying features such as firepits.

Several historic trails would be affected by the proposed developments. The supposed route of the Old Spanish Trail and the Yount-Wolfskill Trail is now a partially paved county road. A fence is proposed to be built across it in one location, and along it in another. The Old Mormon Trail, also an existing dirt road today, would have two

pipelines crossing its route. A portion of the supposed Jedediah Smith Trail is now Interstate 15; a pipeline is proposed to be built across it. The supposed route of the Dominguez-Escalante expedition would have three pipelines and a fence built across it.

Implementation of these proposed developments would have little adverse effect on these trails. Either the trails have already been drastically altered, or the original route is so questionable that most of the proposed developments would not affect trail integrity. Access along the trail could be restricted and the natural aesthetics altered by the fence and pipeline.

LAND USE

Plans, Controls, and Constraints. The proposed action could initiate new or revised agreements such as the range management agreements between the Forest Service and BLM. Percentage license reductions and changes in season of use could effect alterations in the ranch management plans between the livestockmen and the Soil Conservation Service because, in some cases, these plans are tied to the livestock operation on public land.

Land Use. The proposed action would not impact general land uses and would have only limited effect on specific sites. Implementation would initiate shifts in intensity, location, and diversity, but would not preclude other land uses.

Implementation of some management components, particularly custodial, might cause a gradual increase in applications for land exchanges and/or public sale to enlarge private holdings to support a large percentage of the livestock operations. Although such land transactions would be localized, the subsequent change in ownership pattern could alter the present land use by the general public.

Recreation. There is sufficient deer forage available to sustain potential deer numbers on most public land. Because carrying capacity would decline, competition for forage would occur in some areas. Recreation visitor days generated by deer hunting would not change as a result of the proposed action.

Regional hunting of Gambel's quail would not change as a result of the proposed action. Localized loss of forage would sometimes be offset by increased cover and increased benefits resulting from resting the range periodically. The proposal could affect the viewing opportunities in some allotments because of increased vegetation, but most effects would not be measurable or noticeable for many years.

The allotment management plan would not directly affect plants such as Joshua trees, barrel cactus, and yucca.

Fenceline construction proposed in the Sand Mountain area would restrict off-road-vehicle use, especially the east-to-west travel that now occurs. Most of the active sand dunes would remain open to ORV use, and the cattleguard installation along the major dune access road would eliminate existing gate maintenance problems. The construction of 7 new miles of fence would still pose a hazard to off-road-vehicle drivers.

The elimination of grazing in the LaVerkin Creek Allotment would benefit wildlife and related recreational values. Riparian vegetation along the creek would improve aesthetically and as habitat for wildlife.

There would be a beneficial impact from chaining in areas where firewood collection could be authorized. Chained areas are ideal firewood collection sites because of the numerous dead, dry trees.

Visual Resources. The major scenic change which would occur is primarily related to vegetative changes over time. Improved topsoil conditions resulting from improved range management would eventually result in more grassy areas, producing a smoother surface and reflecting more light green and golden brown colors.

In the proposed chaining areas, the visual quality would remain acceptable. Visual resource management (VRM) objectives designed to harmonize these areas with the surrounding environment would be achieved.

Fencelines and pipelines would create small-scale and sometimes temporary lines on the landscape; however, fence design and pipeline installation stipulations noted in the proposed action would minimize the visual change. Visual contrast ratings were made for individual range developments. As a result of these ratings, there would not be any long-term visual impacts and VRM objectives would be attained.

Wilderness. Where any of the 11 types of proposed range developments are placed in areas having wilderness value, some negative impact may occur.

These developments would visually be recognized as manmade intrusions on an otherwise natural landscape. Table 3-14 shows how wilderness values would be affected by livestock grazing and the proposed

range developments. Table 3-15 shows the existing developments which occur on public land within potential wilderness study sectors, and the number of proposed range developments that would lie in these sectors. All range developments are categorized as intrusions which detract from wilderness values; however, no type of existing range development would specifically cause land to be omitted from designation as wilderness if primitive values are dominant. Livestock grazing and most types of range developments could be authorized even in the wilderness sectors if it is determined such developments or livestock grazing on the potential wilderness study sectors is one of degree. Although a few scattered, well-designed developments may have no real impact on wilderness values, the cumulative impact of many small developments could adversely affect wilderness designation potential. So, also, a few head of livestock and the presence of their odor, sound, body waste, and dust from movement, would not preclude designation of wilderness.

None of the proposed projects would be implemented until public lands have been inventoried, consequently, there would be no adverse impact to wilderness values initially. When potential wilderness study areas are defined, management restrictions will remain in force on those areas, but restrictions will be removed from the remaining lands.

Interim management restrictions require an Environmental Assessment Report (EAR) be written for any project proposed in a potential wilderness study area. If the EAR findings indicate the project would adversely affect wilderness values, an environmental statement would be written covering the impacts to wilderness designation potential.

Agriculture (Nongrazing). Reductions in the number of animals allowed on public land and season of use modifications would increase the dependency of livestock operations on private lands. Some livestockmen would have to readjust their operations to provide additional forage during periods when they cannot utilize public lands. Most operations have limited opportunities to make this adjustment.

TABLE 3-14

Effect of Proposed Range Improvements on Wilderness Areas

	Adversely Affect Wilderness Potential	Mechanized Vehicles Required For Construction[a]	Mechanized Vehicles Required For Maintenance
Springs	No if restoration is complete	No	No
Pipelines	No if restoration is complete	Yes	No
Wells	Yes; required maintenance road, fuel supply, and noise	Yes	Yes
Rainfall catchment	Yes; prominent landscape disturbance	Yes	Yes
Water storage tank	Possibly; tanks could be screened from view	Yes	Yes
Water trough	No; very minor intrusion	Yes	Yes
Reservoir	Yes; noticeable land-scape disturbance	Yes	Yes
Fences	Possibly no with isolated fencelines	No	No
Cattleguard	No; cattleguards placed on existing roads only	Yes	Yes
Trails	No	No	No
Seedings (chainings)	Yes	Yes	No
Livestock grazing	No unless concentrations are greater than presently exist	NA	No

[a]Motorized vehicles are not usually permitted to operate in a designated wilderness area.

NA = Not applicable

TABLE 3-15

Existing Range Improvements on Public Land Within Potential Wilderness Study Sectors, and Proposed Range Improvements That Would Lie in These Sectors

Allotment	Springs (units)		Pipelines (miles)		Wells (units)		Catchments (units)		Trough or Tank (units)		Reservoir (units)		Fence (miles)		Trails (miles)		Seeding/Chaining (acres)	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
1. Cougar Canyon	4	3	0	0	0	0	0	0	0	0	2	0	24.0	5.0	0	0	0	0
2. Jackson Peak	2	0	4.0	4.0	0	0	0	1	1	4	1	0	12.0	1.5	0	0	4,500	0
3. Red Mountain	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4. Cottonwood Canyon	0	0	0	0	0	0	0	0	0	0	0	0	8.5	3.0	0	0	0	0
5. LaVerkin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6. Beaver Dam Mountains	6	0	4.0	1.5	0	0	0	1	0	0	2	0	10.5	5.5	0	0	0	2,000
7. Beaver Dam Mountains (south)	0	0	0	0	0	0	0	0	0	0	2	0	1.5	0	0	0	0	0
8. Beaver Dam Wash	0	0	0	0	1	0	0	1	0	0	0	0	11.0	.5	0	0	0	0
9. Sand Mountain	0	1	0	12.0	1	0	0	0	1	4	6	0	23.0	8.5	0	0	0	0
TOTAL	12	4	8.0	17.5	2	0	0	3	2	8	13	0	90.5	24.0	0	0	4,500	2,000

Livestock Grazing. The majority of livestock operators in Washington County would be directly impacted by the proposal. The high dependence on public land would continue to be essential for the ranch unit as a whole. Appendix XIX shows the change in Base Property Qualifications (BPQ) and licensed use. The impact of the proposed action represents a 28 percent decrease in BPQ. This will cause some imbalance with permits and leases on lands utilized other than public land.

If a sustained, yearly supply of forage could be obtained and depended upon, stability of livestock operations would be increased over existing operations that now rely on an unpredictable supply of annual vegetation which fluctuates with moisture conditions. With an established constant herd size, economic conditions could be improved. Martin (1975) revealed in a 29-year study that cow-calf units on semi-desert ranges with flexible stocking produced only $100 to $200 more per 100 head than with constant or limited flexible stocking.

Production Characteristics. Most of the vegetative production, which is the primary constraint on livestock production, is expected to increase over the long term to the potential forage supply shown in Appendix I. Cook (1956) concluded that during winter grazing, grasses are markedly deficient in protein, phosphorus and carotine, but are good sources of energy. In the long term, a higher quality and sustained forage supply would result because grazing systems would provide rest and utilization which would be within allowable levels. In addition, palatable browse species could provide additional nutrients, thereby minimizing any reduced livestock production.

The change in season of use would present some problems with ranch stability. Rental pastures are currently in very high demand and feed is at a record high cost; therefore, the permittees would probably be forced to reduce their herd and/or feed their stock. Private lands could be forced to maximize forage production. The Proposed Action Summary, table 1-10, shows allotments for which changes in season of use are proposed.

The implementation of the proposal would improve livestock distribution and protect the vegetation. However, livestock may lose weight in the short term, as a result of forcing them onto different feed and into new surroundings, and denying them access to regrowth generated in pastures grazed earlier in the year (Hormay, 1970). Benefits derived from a more uniform utilization of the forage could result in less competition between livestock in areas where forage is currently heavily used.

Several allotments are proposed to have an increase in intensity of use. The nutrient intake of grazing animals is influenced by many factors, the most important being intensity of use. As the degree of utilization increases, the content of desirable nutrients decreases because the animals are forced to eat more of the less nutritious portions of the plants. In addition, animals consume less forage daily with the increased degree of utilization which further reduces the actual nutrient intake (Cook, 1956). Paulsen (1975) found that weight gains often are slightly less for complex grazing systems than for continuous grazing probably because the animals are, at times, forced to graze more mature forage. Hormay (1970), however, found that weight gains comparable to those under continuous grazing can be obtained under grazing systems incorporating rest by maximizing livestock distribution.

The calf crop percent would be expected to improve slightly with the increase in range subdivisions (Reynolds and Martin, 1968). Because the proposed systems generally would require more movement of the animals, a higher degree of herd checks would occur. This could be beneficial to livestock production if problems are spotted earlier and corrective measures taken. In the long term, as the quality of vegetation improves, the condition of mother cows would improve and higher calf crop percentage would result.

The consolidation of allotments would force some changes in current breeding practices. Permittees in common allotments would have to agree on the bulls used or establish an independent breeding season. Adherence to a definite breeding season has many advantages. By having a

regular breeding season, a greater percentage of earlier and heavier calves are available at market time. Greater uniformity in calf weights would result in better unit prices and higher overall income (Reynolds and Martin, 1968).

Because these characteristics influence beef production, they determine operator net income, as discussed in the socioeconomic section.

SOCIOECONOMICS

Introduction. The proposal would have limited impacts on the Washington County economy as a whole. However, some adverse and positive impacts would occur to the livestock industry and to specific individuals.

Regional Economics

Population. The proposed action would not impact the county population.

Employment. Employment would not be impacted in measurable terms.

Ranch Economics

General Information. Since approximately 66 percent of the livestock operators in the county utilize public land forage, the county livestock industry would be impacted proportionately. Impacts would be both positive and negative, depending largely upon the analysis time frame.

Ranch Operations Utilizing Public Land. Economic dependence on outside sources of income would continue for many livestock operations in Washington County. Market returns and operator management intensity would not increase. Poor income returns would probably continue for the short term, but should stabilize over the long term. Because of a shortage of rental pastures and extremely high feed costs, it is assumed that a change in herd size would result in a proportionate change in individual livestock operations (Beck, 1976).

Frequently, Washington County permittees do not stock at their full BPQs throughout the grazing season every year. These fluctuations generally can be recognized in each year's licensed use. For 1976, the total licensed use was 68 percent of the maximum allowed in the BPQs. Therefore, with a lower stocking rate, some impacts would be reduced. This would vary by individual. On the average, the proposed action represents a 6-percent increase over the licensed use in 1976, because stocking had been below the allowable capacity that year.

Some total nonuse was taken in 1976 but this had very little effect on the difference between the licensed use and proposed action. Many

livestock operators would not change their livestock numbers but all operations with reductions, would lose some of the economic values associated with grazing permits, e.g., loan collateral and sale value. Table 3-16 contains a summary of economic impacts.

The short-term annual net income would decrease $300 while in the long term, an annual $89,200 increase would be realized as a result of the potential forage production generated, assuming that all qualifications are used, i.e., no nonuse taken.

The capital impacts to the operators would change. Because the capital value is based on the BPQ, a 28 percent change ($70,600) would occur. This short-term impact could jeopardize the borrowing potential of the operators for current and future loans. The percent change in BPQ could be directly proportionate to the loss in borrowing power (Millard Owens, Federal Land Bank 1976: personal communication). The instability of the livestock industry in Washington County would suggest that any further decline in financial security would encourage many individuals to drop out of the livestock industry. The long-term capital value could increase to $107,400.

Because each individual operator would be impacted differently, the description of ranching operations established in Chapter 2 will provide the analysis format for discussion of impacts to the three scales of ranching operation.

<u>Small Operation</u>. The 63 small operations would receive a 33 percent decrease over the BPQ. The base property change ranges between 0 to 100 percent. The short-term annual net income impact could cause negative returns to the livestock operator but many small operators have additional sources of income, so the overall effect on their livelihood would vary. Table 3-17 shows the short-term annual impact to the typical small operator. The long-term annual net income impact could total $8,100 as shown in table 3-18. The small operation's permit value could decline a total of $20,000, 35 percent from the existing value in the short term; in the long term, it could increase 59 percent or almost $30,000.

TABLE 3-16

Economic Impact Summary by Scale of Operation

	Total	Small	Medium	Large
CURRENT NUMBER OF OPERATIONS	108	63	35	10
NET INCOME[a b c]				
Existing net income per AUM	$ NA	$ 1.33	$ 2.11	$ 2.77
Total existing net income	39,831	6,395.00	20,675.00	12,761.00
Short-term net income per AUM	NA	(.28)	2.11	2.85
Total short-term net income	39,513	0	20,675.00	18,838.00
Short-term net income change	318	(6,395.00)	0	6,077.00
Long-term net income without proposal per AUM	NA	(3.79)	.48	1.57
Total long-term net income without proposal	12,945	0	3,564.00	9,381.00
Long-term net income with proposal per AUM	NA	1.47	4.68	3.30
Total long-term net income with proposal	102,180	8,134.00	62,693.00	31,353.00
Long-term net income change	89,226	8,134.00	59,129.00	21,972.00
CAPITAL VALUE[a b c d]				
Existing capital value per AUM	NA	8.66	9.60	8.46
Total existing capital value	255,325	56,723.00	120,136.00	78,466.00
Total short-term capital value	184,710	36,702.00	92,087.00	55,921.00
Short-term capital value change	(70,615)	(20,021.00)	(28,049.00)	22,545.00
Total long-term capital value without proposal	145,271	26,231.00	68,492.00	50,548.00
Total long-term capital value with proposal	253,148	47,916.00	124,854.00	80,378.00
Long-term capital value change	$107,427	$21,685.00	$ 56,362.00	29,830.00

[a] Short-term impacts are considered as being less than one complete grazing cycle and would occur upon implementation of the proposal.
[b] Long-term impacts are considered as occurring after one grazing cycle through the attainment of objective time frame (24 years) and the implementation interval (5 years).
[c] Includes future as viewed 29 years from present with continuing existing management. It is based on predicted levels of forage productin at that time.
[d] It is assumed values per AUM would not change.

NA = Not available.

TABLE 3-17

Annual Short Term Impacts - Average Small Operator

	Existing (dollars)	Proposed[a] Average (dollars)	Percent
INCOME			
Calf sales	2,226.00	1,849.00[b]	
Cull sales	171.00	142.00[b]	
GROSS INCOME	2,397.00	1,991.00[b]	
EXPENSES			
Feed	48.00	40.00[b]	
Grazing fees	68.00	56.00[b]	
Veterinary	61.00	51.00[b]	
Variable expenses	177.00	147.00[b]	
Net change	....	-30.00	-2
Fixed expenses	1,901.00	1,901.00	
TOTAL EXPENSES	2,078.00	2,048.00	
Net change	....	-30	-1
Average cost per cow	103.90	120.47	
Average cost per AUM	8.66	10.04	
NET INCOME			
Gross income	2,397.00	1,991.00	
Total expenses	2,078.00	2,048.00	
NET INCOME	319.00	-57.00	
Net change	....	-376.00	-118
Net income per cow	15.95	-3.35	
Net income per AUM	1.33	- .28	
Average number of cows	20	17	

Note: Short term impacts are considered as being less than one complete grazing cycle and would occur upon implementation of the proposal.

[a]Based on a 17 percent reduction in small operator 1976 licensed use.

[b]It is assumed figures would change proportionate to change in AUMs.

TABLE 3-18

Annual Long Term Impacts - Average Small Operator

	Without[a] Proposal (dollars)	With[b] Proposal (dollars)	Percent
INCOME			
Calf sales	1,358.00	2,485.00[c]	
Cull sales	104.00	190.00[c]	
GROSS INCOME	1,462.00	2,675.00[c]	
Net change	....	+1,213.00	83
EXPENSES			
Feed	29.00	53.00[c]	
Grazing fees	41.00	75.00[c]	
Veterinary	37.00	68.00[c]	
Variable expenses	107.00	196.00[c]	
Net change	....	89.00	83
Fixed expenses	1,901.00	1,901.00	
TOTAL EXPENSES	2,008.00	2,097.00	
Net change	....	+89.00	4
Average cost per cow	167.33	95.32	
Average cost per AUM	13.94	7.94	
NET INCOME			
Gross income	1,462.00	2,485.00	
Total expenses	-2,008.00	2,097.00	
NET INCOME	-546.00	388.00	
Net change	....	+934.00	171
Net income per cow	-45.50	17.64	
Net income per AUM	3.79	1.47	
Average number of cows	12[d]	22	

Note: Long term impacts are considered as occurring after one grazing cycle through the attainment of objective time frame (24 years) and the implementation interval (5 years).

[a]Includes the future as viewed 29 years from present with continuing existing management. It is based on predicted levels of forage production at that time.

[b]Based on a potential 83 percent increase in small operator Base Property Qualifications.

[c]It is assumed that figures would change proportionate to change in AUMs.

[d]This is lower than the existing level represented in Chapter 2.

Medium Operation. This scale would receive a 23-percent decrease in BPQs. The base property change ranges between 4 to 100 percent. The proposal would cause no change in the short-term annual net income because this scale frequently does not stock at full BPQ. The long-term increase would equal $59,000., The typical impacts can be seen in table 3-19 and 3-20. The capital value for this scale would decline $28,000 (23 percent) in the short term. However, an 82-percent increase in this value ($56,000) could occur in the long term.

Large Operation. Although few in number, the 10 large operators, currently control 32 percent of the allocated AUMs. The proposed action would reduce their total BPQs 29 percent in the short term. The base property change ranges between 1 to 100 percent. The typical short-term impacts to annual net income, can be seen in table 3-21. Table 3-22 depicts the typical long-term annual net income impacts which total almost $22,000, a 233-percent increase. The capital value would initially decrease $22,500 (29 percent). In the long term, however, it could increase nearly $30,000 (59 percent).

Public Attitudes and Values

General. The proposal could impact the public attitudes and values of the people in Washington County. These impacts can be segregated between the rural and urban sectors.

Ranch Attitudes and Values. With the implementation of the proposed action, many of the livestock operators utilizing public land may feel a greater governmental control over their livelihood. Consolidation of allotments could result in a loss of individualism with respect to their management desires. Although these individuals would benefit financially from better range conditions, most feel that the proposal would not be the best method to achieve this condition. The majority have stated that the current low forage production is a result of temporary drought conditions and that voluntary reductions in stocking, recognized in the lower licensed use are all that is necessary to improve range conditions. Many feel that the estimated benefits from better forage conditions and improved livestock distribution through the proposal

would be offset by allotment consolidation. Some individuals may become less satisfied with their lifestyle, especially if economic returns are less. In the short term, most operators would be severely impacted initially because of the decline in the resale and collateral values of their livestock operation. Profit resale goals would be reduced. Therefore, it is the belief of many livestock operators that the proposed action would not be in their best interest. Most, however, are predicted to continue in the industry.

Urban Attitudes and Values. The urban attitudes and values are not expected to change to any significant degree. Individuals not engaged in the industry may find the proposal desirable in view of the prospect of an increase in wildlife, soil stability, and improved visual appearance of the range.

TABLE 3-19

Annual Short Term Impacts - Average Medium Operator

	Existing 3-year Average (dollars)	Proposed Average (dollars)
INCOME		
Calf and yearling sales	11,470.00	
Cull sales	1,890.00	
Pasture rent	1,392.00	
GROSS INCOME	14,752.00	
EXPENSES		
Feed	1,992.00	
Grazing fees	1,116.00	
Veterinary	47.00	
Variable expenses	3,155.00	
Hired labor	1,095.00	
Taxes	1,517.00	
Insurance	243.00	
Interest	553.00	NO CHANGE
Depreciation	2,326.00	
Other fixed expenses	3,201.00	
Total fixed expenses	8,935.00	
TOTAL EXPENSES	12,090.00	
Average cost per cow	115.15	
Average cost per AUM	9.60	
NET INCOME		
Gross income	14,752.00	
Total expenses	12,090.00	
NET INCOME	2,662.00	
Net income per cow	25.35	
Net income per AUM	2.11	
Average number of cows	105	

Note: Short-term impacts are considered as being less than one complete grazing cycle and would occur upon implementation of the proposal.

TABLE 3-20

Annual Long Term Impacts - Average Medium Operator

	Without[a] Proposal (dollars)	With[b] Proposal (dollars)	Percent
INCOME			
Calf and yearling sales	8,602.00	15,484.00[c]	
Cull sales	1,417.00	2,551.00[c]	
Pasture rent	1,740.00	3,132.00[c]	
GROSS INCOME	11,759.00	21,167.00[c]	
Net change	....	+9,408.00	80
EXPENSES			
Feed	1,494.00	2,689.00[c]	
Grazing fees	837.00	1,507.00[c]	
Veterinary	35.00	63.00[c]	
Variable expenses	2,366.00	4,259.00c	
Net change	....	+1,893.00	80
Total fixed expenses	8,935.00	8,935.00	
TOTAL EXPENSES	11,301.00	13,194.00	
Net change	....	+1,893.00	17
Average cost per cow	143.05	92.92	
Average cost per AUM	11.92	7.74	
NET INCOME			
Gross income	11,759.00	21,167.00	
Total expenses	11,301.00	13,194.00	
NET INCOME	458.00	7,973.00	
Net income per cow	5.80	56.15	
Net income per AUM	.48	4.68	
Average number of cows	79[d]	142	

Note: Long term impacts are considered as occurring after one grazing cycle through the attainment of objective time frame (24 years) and the implementation interval (5 years).

[a]Includes the future as viewed 29 years from present with continuing existing management. It is based on predicted levels of forage production at that time.
[b]Based on a potential 80 percent increase in operator Base Property Qualifications.
[c]It is assumed figures would change proportionate to change in AUMs.
[d]This is lower than the existing level represented in Chapter 2.

TABLE 3-21

Annual Short Term Impacts - Large Operator

	Existing 3-Year Average (dollars)	Proposed[a] Average (dollars)	Percent
INCOME			
Livestock production and cull sales	24,944.00	34,672.00[b]	
Return to operator	3,258.00	4,529.00[b]	
Other	7,195.00	7,195.00	
GROSS INCOME	35,397.00	46,396.00	
Net change	....	+10,999.00	31
EXPENSES			
Feed	2,892.00	4,020.00[b]	
Grazing fees	2,951.00	4,102.00[b]	
Veterinary	195.00	271.00[b]	
Trucking	832.00	1,156.00[b]	
Variable expense	6,870.00	9,549.00[b]	
Net change	....	+2,679.00	39
Fixed expenses	19,118.00	19,118.00	
TOTAL EXPENSES	25,988.00	28,667.00	
Net change	....	+2,679.00	10
COSTS			
Total expenses	25,988.00	28,667.00	
Return to operator	3,258.00	4,529.00	
TOTAL COST	29,246.00	33,196.00	
Net change	....	+3,950.00	14
Cost per cow	101.55	64.08	
Cost per AUM	8.46	5.34	
NET INCOME			
Gross income	35,397.00	46,396.00	
Total expense	-25,988.00	-28,667.00	
NET INCOME	9,409.00	17,719.00	
Net change	....	+8,325.00	188
Net income per cow	32.8	34.23	
Net income per AUM	2.77	2.85	
Average number of cows	288	518	

Note: Short-term impacts are considered as being less than one complete grazing cycle and would occur upon implementation of the proposal.

[a] Based on a 39 percent increase in large operator 1976 licensed use.
[b] It is assumed figures would change proportionate to change in AUMs.

TABLE 3-22

Annual Long Term Impacts - Large Operator

	Without[a] Proposal (dollars)	With[b] Proposal (dollars)	Percent
INCOME			
Livestock production and cull sales	18,708.00	29,746.00[c]	
Return to operator	2,443.00	3,884.00[c]	
Other	7,195.00	7,195.00	
GROSS INCOME	28,346.00	40,825.00	
Net change	....	+12,479.00	44
EXPENSES			
Feed	2,169.00	3,449.00[c]	
Grazing fees	2,213.00	3,519.00[c]	
Veterinary	146.00	232.00[c]	
Trucking	624.00	992.00[c]	
Variable expense	5,152.00	8,122.00[c]	
Net change	....	+2,970.00	58
Fixed expenses	19,118.00	19,118.00	
TOTAL EXPENSES	24,270.00	27,240.00	
Net change	....	+2,970.00	12
COSTS			
Total expenses	24,270.00	27,240.00	
Return to operator	2,443.00	3,884.00	
TOTAL COST	26,713.00	31,124.00	
Net change	....	+4,411.00	17
Cost per cow	101.55	93.92	
Cost per AUM	8.46	7.83	
NET INCOME			
Gross income	28,346.00	40,825.00	
Total expense	-24,270.00	27,240.00	
NET INCOME	4,076.00	13,585.00	
Net change	....	+9,509.00	233
Net income per cow	18.87	39.61	
Net income per AUM	1.57	3.30	
Average number of cows	216d	343	

Note: Long term impacts are considered as occurring after one grazing cycle through the attainment of objective time frame (24 years) and the implementation interval (5 years).

[a]Includes the future as viewed 29 years from present with continuing existing management. It is based on predicted levels of forage production at that time.
[b]Based on potential 59 percent increase in large operator Base Property Qualifications.
[c]It is assumed figures would change proportionate to change in AUMs.
[d]This is lower than the existing levels represented in Chapter 2.

CHAPTER 4

MITIGATING MEASURES NOT INCLUDED IN THE PROPOSED ACTION

CHAPTER 4
MITIGATING MEASURES

INTRODUCTION

The mitigating measures proposed in this chapter would be committed by the Bureau of Land Management (BLM), if the proposed action is implemented. The following measures are considered feasible and necessary over and above those measures addressed in Chapter 1, i.e., decisions in the Management Framework Plan (MFP), general and specific design restrictions, BLM manuals such as visual resource management guidelines and construction guidelines, regulatory requirements such as adjusting stocking rates within grazing capacities, protection of antiquities, and protection of threatened and endangered plants and animals.

Table 4-1 summarizes mitigating measures developed for impacts that would occur on portions of 21 allotments. The resource affected and an evaluation of the effectiveness of the mitigation are included in the table. The narrative following the table describes the impact, need for mitigation, and type of measures taken by each resource in summary form. Allotments having negative impacts for which no mitigating measures have been identified are covered either in Chapter 5 or Chapter 8.

SOILS

Soils with high erosion potentials would need to be protected to avoid accelerating soil loss caused by construction or improvement of springs, troughs, wells, and catchments. Special precautions would need to be taken on 2,280 acres proposed for vegetative manipulation where soils are shallow and have low water-holding capacities and/or high erosion potentials.

Stream bank erosion caused by physical stream bank damage can be mitigated by fencing heavily used areas to exclude livestock (when land ownership patterns permit) if the proposed action does not improve the riparian condition and trend after one full grazing cycle (3 years).

Soil erosion would be accelerated on allotments where the vegetation is impacted. Mitigating measures which benefit vegetation would also improve soil conditions (table 4-1).

TABLE 4-1

Mitigating Measures

Proposed Allotment	Cause Agent	Impact	Mitigating Measure	Resource Affected	Evaluation of Mitigation
Alger Hollow	Proposed seeding on shallow soils.	Increased soil erosion; unsuccessful seeding.	Limit seeding to deeper soils with favorable waterholding potential such as Naplene silt loam, and Redbank fine sandy loam.	Soils.	Successful seeding; minimal soils loss.
	Fence construction through site number HD 42WS16.	Flaking station disturbed.	Construct fence by hand through site.	Cultural	Destruction of site minimized; mitigated as fully as possible.
Beaver Dam Slope	Utilization limit set for cattle on annual forage but did not consider total annual forage production relative to tortoise needs.	Competition for annual forage between desert tortoise and cattle.	Initiate study to determine total annual production and monitor limit of utilization by cattle to insure that annual forage would be available for the tortoise when livestock leave the area at the end of April.	Wildlife (desert tortoise).	Impact minimized - not mitigated fully; little information is available on tortoise needs and competition would still occur in areas of tortoise concentration, primarily washes.
Bull Mountain	Increased livestock use, accelerated trampling damage, mechanical disturbance and removal of riparian vegetation in West Fork of Beaver Dam Wash.	Decline of desirable vegetation and cover in riparian area. Increased sedimentation.	Monitor and evaluate the affects of the proposed action to assure existing condition and trend of riparian vegetation and fishery habitat improves. Fence, restrict harmful livestock use, or take appropriate actions or measures necessary to protect these areas from further degradation resulting from proposed action.	Soils, vegetation	Impact minimized - not mitigated fully in the short term. Upper two pastures would continue to degrade until the end of the first grazing cycle after which time management steps would be taken to prevent further degradation of the riparian and fisheries habitat as per Virgin River MFP.
Boot Spring	Installation of troughs on unstable soils.	Increase erosion.	Move troughs to stable soils; may need more pipe to reach stable soils.	Soils.	Fully mitigated.
Cougar Canyon	Increased livestock use, accelerated trampling damage, mechanical disturbance and removal of riparian vegetation in West Fork of Beaver Dam Wash.	Decline of desirable vegetation and cover in riparian area. Increased sedimentation.	Monitor and evaluate the affects of the proposed action to assure existing condition and trend of riparian vegetation and fishery habitat improves. Fence, restrict harmful livestock use, or take appropriate actions or measures necessary to protect these areas from further degradation resulting from proposed action.	Soils, vegetation	Impact minimized - not mitigated fully in the short term. Would continue to degrade until the end of the first grazing cycle after which time management steps would be taken to prevent further degradation of the riparian and fisheries habitat as per Virgin River MFP.

(continued)

TABLE 4-1 (continued)

Proposed Allotment	Cause Agent	Impact	Mitigating Measure	Resource Affected	Evaluation of Mitigation
Dagget Flat	Seeded areas within pastures would be heavily used under the proposal due to the selectivity of grazing animals.	Decline in desirable vegetation for deer and livestock; increased erosion.	Close gate between pastures after cattle are rotated to prevent continued use of seeded areas.	Soils, vegetation, wildlife.	Fully mitigated. Increase in desirable vegetation for livestock and deer.
Desert Inn	Heavy use of riparian areas.	Increased erosion and stream bank caving.	Monitor and evaluate the affects of the proposed action to assure existing condition and trend of riparian vegetation and fishery habitat improves. Fence, restrict harmful livestock use, or take appropriate actions or measures necessary to protect these areas from further degradation resulting from proposed action.	Soils, vegetation	Impact minimized - not mitigated fully in the short term. Would continue to degrade until the end of the first grazing cycle after which time management steps would be taken to prevent further degradation of the riparian and fisheries habitat as per Virgin River MFP.
Fort Pierce	Heavy use adjacent to Ft. Pierce Wash.	Loss of palatable species for livestock adjacent to water; loss of cover and increase in sediment in water.	Monitor and evaluate the proposed action to determine condition and trend of riparian vegetation yearly. At the end of one cycle of grazing, if the riparian condition and trend is not improving, limit livestock access to the perennial water below old Ft. Pierce ruins by two gap fences and one side fence for about 0.5 mile.	Vegetation, wildlife, water resources, soils.	Increase of vegetation in heavy use area. Reduce sediment in Ft. Pierce Wash. Impact minimized - not fully mitigated in the short term. Further degradation of the riparian habitat possible until the end of the first grazing cycle after which time management steps would be taken as per the Virgin River MFP.
	Fence construction through site number HD 42WS440 and tying into site number HD 42WS520.	Flaking station and rock art panel disturbed.	Construct fence by hand through site and adjust fence location to prevent tying into rock art panel.	Cultural	Destruction of sites minimized; mitigated as fully as possible.
	Pipeline crosses Honeymoon Trail.	Disturb trail.	Locate pipeline beneath road by digging trenches on either side and forcing through.	Cultural	Fully mitigated. Trail will not be disturbed.

(continued)

TABLE 4-1 (continued)

Proposed Allotment	Cause Agent	Impact	Mitigating Measure	Resource Affected	Evaluation of Mitigation
Grafton	Heavy use of riparian areas.	Increased erosion and stream bank caving.	Monitor and evaluate the affects of the proposed action to assure existing condition and trend of riparian vegetation and fishery habitat improves. Fence, restrict harmful livestock use, or take appropriate actions or measures necessary to protect these areas from further degradation resulting from proposed action.	Soils, vegetation	Impact minimized - not mitigated fully in the short term. Would continue to degrade until the end of the first grazing cycle after which time management steps would be taken to prevent further degradation of the riparian and fisheries habitat as per Virgin River MFP.
Gunlock	Fence construction through site number HD 42WS360.	Habitation site disturbed.	Construct fence by hand through site.	Cultural	Destruction of site minimized; mitigated as fully as possible.
Hurricane Fault	Troughs on highly erodible soils. Heavy use of riparian areas.	Increased erosion and stream bank caving.	Place troughs on stable soils. Monitor and evaluate the affects of the proposed action to assure existing condition and trend of riparian vegetation and fishery habitat improves. Fence, restrict harmful livestock use, or take appropriate actions or measures necessary to protect these areas from further degradation resulting from proposed action.	Soils, vegetation	Reduce erosion potential. Impact minimized - not mitigated fully in the short term. Would continue to degrade until the end of the first grazing cycle after which time management steps would be taken to prevent further degradation of the riparian and fisheries habitat as per Virgin River MFP.
Jackson Wash	Seeding on shallow soils with low moisture holding capacity. Stocking rate - imbalance between pastures.	Increased erosion; loss of desirable vegetation for livestock and deer.	Relocate seeding to deeper soils with high moisture holding capacity or reduce stocking to present inventory level.	Soils, vegetation, wildlife.	Fully mitigated; reduce soil loss; improve desirable vegetation on pasture seedings.
Little Creek Mountain	Chaining and seeding project.	Habitation sites disturbed.	Avoid traversing known sites during chaining; take appropriate measures to assure that sites are preserved but not conspicuous.	Cultural	Destruction of known sites minimized; unknown sites unmitigated.

(continued)

TABLE 4-1 (continued)

Proposed Allotment	Cause Agent	Impact	Mitigating Measure	Resource Affected	Evaluation of Mitigation
Red Cliffs	Heavy use on areas adjacent to perennial water in Leeds Creek.	Decline of desirable vegetation and cover adjacent to Leeds Creek Springs; increased bank caving and sediment flow. Spinedace negatively impacted.	Monitor and evaluate the affects of the proposed action to assure existing condition and trend of riparian vegetation and fishery habitat improves. Fence, restrict harmful livestock use, or take appropriate actions or measures necessary to protect these areas from further degradation resulting from proposed action.	Soils, vegetation, wildlife, water resources fisheries.	Improve cover for wildlife; reduce sediment flow; improve vegetation at Leeds Creek Springs; protect spinedace habitat; fully mitigated.
Scarecrow Peak	Heavy use of riparian areas.	Increased erosion and stream bank caving.	Monitor and evaluate the affects of the proposed action to assure existing condition and trend of riparian vegetation and fishery habitat improves. Fence, restrict harmful livestock use, or take appropriate actions or measures necessary to protect these areas from further degradation resulting from proposed action.	Soils, vegetation	Impact minimized - not mitigated fully in the short term. Would continueto degrade until the end of the first grazing cycle after which time management steps would be taken to prevent further degradation of the riparian and fisheries habitat as per Virgin River MFP.
Short Creek	Placing troughs on unstable soils.	Increase erosion.	Move troughs to area of stable soils.	Soils	Fully mitigated. Erosion reduced and vegetation improved.
Snow Holding Pasture	Spring use every year.	Decline of palatable vegetation for livestock and wildlife; increased erosion.	Seed areas of suitable soils; develop 2-pasture deferred management system; adjust stocking rate after establishment of seeding.	Soils, vegetation, wildlife.	Fully mitigated. Erosion reduced and vegetation improved for livestock and wildlife.
Toquerville	Troughs placed on unstable soils.	Increased soil erosion.	Move troughs to area of stable soils.	Soils, vegetation, wildlife.	90 percent mitigated if troughs are moved frequently, reducing erosion potential.
Trail	Troughs placed on unstable soils.	Increased soil erosion.	Move troughs to area of suitable soils.	Soils.	Fully mitigated. Erosion reduced.
Twin Peaks	Seeding on shallow soils with low water-holding capacity in area of low precipitation.	Increased soil erosion loss in deer feed and desirable livestock forage.	Seed only in suitable soils when there is sufficient soil moisture for seeding.	Soils, vegetation, wildlife.	Fully mitigated. Erosion reduced, livestock and deer forage improved.

(continued)

TABLE 4-1 (concluded)

Proposed Allotment	Cause Agent	Impact	Mitigating Measure	Resource Affected	Evaluation of Mitigation
Virgin and Mountain Dell (Custodial)	Heavy use of stream bank vegetation on North Creek.	Increased soil loss, sedimentation and decline of palatable species on stream banks of North Creek. Warm water fish habitat affected, especially spinedace.	Monitor and evaluate the affects of the proposed action to assure existing condition and trend of riparian vegetation and fishery habitat are improved. Fence, restrict harmful livestock use, or take appropriate actions or measures necessary to protect these areas from further degradation resulting from proposed action.	Soils, vegetation, wildlife, water resources.	Mitigated as fully as possible unless monitoring the riparian habitat indicates further degradation at which time management steps would be taken to improve the condition of the riparian habitat as per Virgin River MFP.

VEGETATION

The proposed grazing system for Dagget Flat Allotment allows for cattle to drift from one pasture to another which would result in utilization of two pastures at the same time for part of the use period. Because cattle prefer grazing on the existing seeding, heavy grazing would continue on the first pasture used. The situation could be mitigated by moving the livestock from one pasture to the second and closing the gate when proper utilization is obtained.

The proposed management systems were designed for improvement in general vegetation. This would be accomplished in the area as a whole, but certain riparian areas used by livestock would still remain static or deteriorate. Livestock numbers could be greatly reduced and still have an adverse impact on a small area around water.

Because specific information on the response of riparian areas to the proposed grazing and resting treatments is limited, transects would be established in certain areas. If the proposed action does not improve the riparian habitat condition and trend after one full grazing cycle on the allotments shown in table 4-1, then fences would be constructed to control livestock around riparian areas where land ownership patterns permit.

WILDLIFE

Certain mitigating measures for vegetation, soils, and water resources would also reduce adverse impacts on wildlife. The allotments affected and the mitigating measures are shown in table 4-1.

In the 1 year out of 3 that livestock graze the tortoise areas in the spring, some competition for annual forage would occur between the cattle and tortoise. The objective in the Beaver Dam Allotment Management Plan (AMP) is to ensure that adequate forage remains for the tortoise after the livestock are taken off. No utilization limit was set for cattle on total annual forage production. The mitigating measure would be to determine the total annual production and monitor utilization to provide available annual forage for the tortoise when livestock leave the area at the end of April.

Loss of riparian vegetation also means a loss of habitat for small mammals and birds. The decline of riparian areas in the Virgin, Fort Pierce, and Red Cliffs Allotments will be mitigated by monitoring the condition and trend of the riparian vegetation, and fencing to exclude livestock if these areas do not show an improving trend after one grazing cycle.

WATER RESOURCES AND FISHERIES

There are several streams with existing fisheries' habitat containing endangered, sensitive, and sport fishes, where early consideration would be given to providing needed protection measures to further manage livestock grazing, such as fencing. In these as well as other areas, a monitoring program as needed would be established in order to determine existing condition and trend of the riparian and fisheries' habitat and management objectives. Selected fisheries' habitat would be monitored before, during, and after implementation of the proposed action. A monitoring plan is being developed utilizing an interdisciplinary team approach. Study procedures, evaluation, and monitoring would be in accordance with BLM manual requirements.

In addition, the program would be designed to accomplish certain other management needs: determine baseline information by fencing small, selected sites along representative habitat (conditions); determine interrelationships of conditions from one allotment to another and impacts from any combination of grazing systems proposed along individual streams by focusing on streams as a whole; determine impacts caused by various grazing systems on stream hydrogeomorphology reflecting different habitat conditions, i.e., poor, fair, good, excellent; and establish data base useful for future management of fisheries and riparian habitat on other public lands.

The MFP objective and recommendation to protect the riparian and aquatic habitat is summarized in table 1-11 under Wildlife Activity Part B. This summary makes it clear that water sources and riparian habitat areas would be monitored before, during, and after implementation, and if the proposed action (AMPs) does not improve the riparian and aquatic habitat in one complete cycle (usually 3 years), management steps as necessary would be taken to achieve objectives for the fish and riparian habitat areas, such as fencing in critical habitat areas.

CULTURAL RESOURCES

Specific known areas of impact would receive the mitigating measures shown in table 4-1. Other areas are mitigated by design restrictions in Chapter 1.

LAND USE

Recreation. In authorized off-road-vehicle (ORV) areas such as Sand Mountain, fences would be installed to contrast with the natural surroundings so that fencelines would be visible.

Livestock Grazing. Little, if any mitigation appears to be feasible with the current management intensity, economic status, and forage production.

Wilderness. Much of the visual intrusion which would result from construction and maintenance of the proposed range improvements would be effectively reduced and in some cases, eliminated by design restrictions listed in Chapter 1. Although adverse effects to wilderness values would persist, the intensity of surface disturbance and maintenance activity can be further reduced to a point that would be more compatible with wilderness management.

Springs, Pipelines, Fences, or Water Troughs. Maintenance or construction work would be accomplished without the use of motorized vehicles in those areas found suitable for wilderness designation.

Well Maintenance. Vehicles traveling to the well site for maintenance purposes would use one trail only, with travel for the lessee limited solely for well maintenance, and trail access restricted by a locked gate where the trail enters a designated wilderness sector.

Tanks and Troughs. All tanks or troughs approved for location in designated wilderness sectors would be screened from view by natural vegetation (pinyon-juniper trees) and/or by topographic factors such as in small depressions on the landscape or by surface rock outcrops.

Reservoirs. In case of washout requiring reservoir reconstruction, a bulldozer would be "walked in" (blade in the air) and no surface or vegetative clearing would be permitted. Reconstruction would be accomplished in as short a period of time as possible after the ground surface is dry and when feasible during a low recreational use season.

SOCIOECONOMICS

Mitigating measures to offset socioeconomic impacts have not been identified. Any socioeconomic mitigation would be a result of an increase in management intensity on the part of the livestock operator.

CHAPTER 5

ANY ADVERSE IMPACTS WHICH CANNOT BE AVOIDED SHOULD THE PROPOSAL BE IMPLEMENTED

5

CHAPTER 5
ADVERSE IMPACTS WHICH CANNOT BE AVOIDED SHOULD THE PROPOSAL BE IMPLEMENTED

INTRODUCTION

Implementation of the proposed action would result in certain unavoidable adverse impacts. These are residual impacts remaining after application of mitigating measures described in Chapter 4.

SOILS

Short-term impacts to soils would cause an increase in erosion on 182,662 acres; infiltration would be reduced on 116,641 acres (table 3-2). Construction of range developments would offset a short-term soil disturbance on 5,255 acres (table 3-12). Soils on most allotments would be expected to improve over time and with mitigating measures described in Chapter 4. Table 5-1 shows those allotments where erosion would continue in the long term.

Ten allotments would have unmitigated adverse impacts (table 5-2) resulting in an increase of erosion, decrease in fertility, and a decrease in infiltration if the proposed action is implemented as planned.

Chapter 8, Alternative 7 includes an alternative plan to overcome the adverse impacts on these allotments.

TABLE 5-1

Unavoidable Long-term Adverse Impacts

Proposed Allotment	Acres of Public Land Affected	Unavoidable Adverse Impact	Resource Affected	Remarks
Airport	147	Yearly spring use would cause decline of desirable vegetation.	Vegetation	See Chapter 8, Alternative 7.
Apex Slope	2,986	Decline in palatable vegetation and browse; decreased production; downward range trend; increased erosion. Lower the carrying capacity for deer.	Soils, vegetation, wildlife	See Chapter 8, Alternative 8.
Beaver Dam Slope	5,120	Livestock grazing could result in competition with the Desert Tortoise during the spring time 1 year out of 3 in concentration areas.	Wildlife	See Chapter 8, Alternative 7.
Black Canyon	600	Decline of desirable vegetation for deer and livestock; increased soil erosion; loss in deer forage.	Soils, vegetation, wildlife.	See Chapter 8, Alternative 7.
Boomer Hill	1,428	When pastures are grazed by livestock, competition with deer for browse would increase, lowering the carrying capacity for deer.	Wildlife	See Chapter 8, Alternative 7.
Box Canyon	659	Spring use every year would cause a decline of desirable vegetation; increase erosion.	Soils, vegetation	See Chapter 8, Alternative 7.
Coalpits (Custodial)	2,525	Fall-winter every year use by livestock may result in competition with deer, lowering the carrying capacity for deer.	Wildlife, vegetation	See Chapter 8, Alternative 7.
Curly Hollow (Holding pasture)	1,410	Decline in palatable vegetation; decreased production; downward range trend; decline in browse.	Wildlife, vegetation	....
Dalton Wash	855	Decline of desirable vegetation; increase in erosion; decline of browse due to spring use every year, loss of deer forage.	Soils, vegetation, wildlife	See Chapter 8, Alternative 7.
Fault	785	Decline of palatable species of vegetation from yearly spring use.	Vegetation	See Chapter 8, Alternative 7.
Gunlock	6,334	Livestock grazing on the Santa Clara River below Gunlock Reservoir may result in a reduction of riparian vegetation, and subsequently, cover and feed for quail, small mammals, and birds. Increased sedimentation in the river may affect fishes. Decline in browse and subsequent lower carrying capacity for deer.	Wildlife, water resources, soils	See Chapter 8, Alternative 7.
Herd House (Custodial)	480	Decline of palatable vegetation, increased soil erosion from yearly spring use. Increased competition for available forage for quail.	Soils, vegetation, wildlife	See Chapter 8, Alternative 7.

(continued)

TABLE 5-1 (concluded)

Proposed Allotment	Acres of Public Land Affected	Unavoidable Adverse Impact	Resource Affected	Remarks
Hurricane (Custodial)	160	Decline in palatable vegetation; increased erosion; decreased production; downward range trend.	Soils, vegetation, wildlife	See Chapter 8, Alternative 7.
Hurricane Mesa (Custodial)	3,521	Decline in palatable vegetation and browse, increased erosion, and competition with deer.	Soils, vegetation, wildlife	See Chapter 8, Alternative 7.
Jackson Wash	28,680	Seeding pasture would show a decline in palatable species. Competition between livestock, deer, and quail would result in lowering the carrying capacity for livestock and wildlife.	Wildlife, vegetation, soils	See Chapter 8, Alternative 7.
Lamoreaux	160	Spring use every year by both livestock and deer would cause a decline in desirable vegetation and result in competition for forage.	Vegetation, wildlife	See Chapter 8, Alternative 7.
Land Hill	105	Livestock grazing during the winter may result in competition for browse with deer, resulting in lowering the carrying capacity for deer.	Wildlife	See Chapter 8, Alternative 7.
Mesa (Custodial)	940	Decline in palatable vegetation and browse, increased erosion, and competition with deer.	Soils, vegetation, wildlife	See Chapter 8, Alternative 7.
North Grafton	500	Decline of desirable vegetationand browse for livestock and deer; increase in erosion.	Soils, vegetation, wildlife	See Chapter 8, Alternative 7.
Red Butte (Custodial)	894	Decline in palatable vegetation and browse, increased erosion, and competition with deer.	Soils, vegetation, wildlife	See Chapter 8, Alternative 7.
Rock Spring	820	Decline in browse and subsequent lower carrying capacity for deer would result in increased competition.	Wildlife	See Chapter 8, Alternative 7.
Sand Hills	992	Decline of desirable vegetation. Increased competition for forage between livestock and quail.	Vegetation, wildlife	See Chapter 8, Alternative 7.
Sand Wash Reservoir	640	Spring use every year would cause a decline in desirable vegetation and browse for livestock and wildlife. Deer and quail impacted.	Vegetation, wildlife	See Chapter 8, Alternative 7.
Santa Clara Creek	304	Livestock use every winter on the Santa Clara Creek may result in reduction of vegetation, and subsequently, feed for deer and quail.	Wildlife, vegetation	See Chapter 8, Alternative 7.
Smith Mesa	1,940	Decline in palatable vegetation and browse, increased erosion, and competition with deer.	Wildlife, vegetation, soils	See Chapter 8, Alternative 7.
White Dome (Custodial)	984	Spring use every year; decline in palatable vegetation. Competition for available forabe between quail and livestock.	Soils, vegetation, wildlife	See Chapter 8, Alternative 7.
Yellow Knolls	525	Spring use every year; decline in palatable vegetation for livestock and quail.	Vegetation, wildlife	See Chapter 8, Alternative 7.

TABLE 5-2

Unavoidable Impacts to Soils by Allotment

Allotment Name	Maximum Total Public Land Acres Affected
Apex Slope (winter pasture)	2,986
Black Canyon (custodial)	600
Box Canyon (custodial)	659
Dalton Wash (custodial)	855
Fault (custodial)	785
Herd House (custodial)	480
Hurricane (custodial)	160
Hurricane Mesa (custodial)	3,521
North Grafton (custodial)	500
White Dome (custodial)	984
TOTAL	11,530

VEGETATION

Short-term vegetative impacts are associated with individual grazing treatments, primarily the removal of vegetation during a prescribed period of use (Chapter 3). In the long term, most impacts would be mitigated with the resting and rotational sequences proposed in the various grazing systems and with mitigating measures developed in Chapter 4. The construction of range developments would also result in short-term impacts to vegetation on 5,255 acres (table 3-12). Over time and with the design restrictions (described in Chapter 1) developed for specific range developments, unavoidable adverse impacts to vegetation resulting from construction of range developments would be minimal.

Twenty-seven proposed allotments containing 64,494 acres of public land would continue to decline in vegetative condition. This decline would occur because proposed stocking rates exceed the surveyed grazing capacity on these allotments, there is competition between deer and livestock for browse or imbalances in the stocking rate by pastures, and seasons of use do not allow for periodic completion of plant growth. No mitigating measure would be proposed for a portion of one allotment which contains 1,410 acres. However, 26 proposed allotments, containing 47,087 acres, have alternative measures outlined in Chapter 8, Alternative 7, that reduce or eliminate some adverse impacts. Table 5-1 indicates those allotments where adverse impacts to vegetation would occur.

WILDLIFE

The long-term decrease in browse in 18 allotments (table 5-1), would eventually lower the carrying capacity for deer. This would result in competition between cattle and deer for browse in those allotments that are important or critical to deer (table 3-13) and have fall and/or winter livestock use. Of the total 17,081 AUMs available for wildlife in the entire ES area, the carrying capacity could eventually be lowered approximately 985 AUMs in 13 of the 18 allotments that are critical to deer. The additional 43 miles of fence would be an unavoidable hazard to deer (Chapter 3). However, the total impact of the fences on mortality and restrictions of movement would be negligible to the overall population.

Unavoidable adverse impacts to quail on nine allotments (table 5-1) would result from a decrease in annuals and forbs due to natural competition with livestock (table 3-13) and the subsequent reduced availability to quail. All nine allotments are important quail habitat (table 3-13).

The short-term impacts of animal competition for forage in 29 allotments (table 3-13), when over 50 percent of the current year's growth is used by livestock in those pastures being grazed, cannot be avoided.

In those 20 allotments where range trend and production would continue to decline, loss of cover and food for small mammals and birds would be unavoidable.

The decline in 5,120 acres of tortoise habitat outside the Woodbury Desert Study Area, particularly in areas of livestock concentration, would continue and the adverse impacts on the remaining 250 to 300 tortoises would be unavoidable.

WATER RESOURCES AND FISHERIES

Water Resources. Long-term, adverse impacts to water quality could occur in areas not subject to the monitoring program identified in Chapter 4. These areas would probably be restricted to areas having intermittent stream flows, riparian communities, and fishery habitat. Short-term, adverse impacts to water quality could occur in the streams where monitoring would be conducted. It would require a short period of time before changes would be discovered. In addition, a short time interval, when impacts could occur would exist until necessary established mitigating measures became effective.

Fisheries. During the first cycle of a grazing management system, some short-term adverse impacts to fisheries habitat would occur as described in Chapter 3. Benefits gained during rest periods could be lost after grazing resumed. Continuation of short-term impacts would occur until they were identified through monitoring, mitigating measures were implemented, and the mitigation became effective in reducing or eliminating the adverse impacts. The nature and magnitude of any unavoidable adverse impacts would depend upon the final selection of a mitigating measure.

LAND USE

Implementing the proposed action could result in revision of some ranch management plans, plus the increased possibility of land exchanges or sales.

Change in land usage as a result of elimination of livestock from certain areas cannot be avoided.

Recreation. Off-road vehicle use across portions of Sand Mountain would be restricted by the proposed fencing in that area.

Visual Resources. In chained areas, there would be a period of 2 or 3 years before uniform ground cover would be established. During the interim, brush piles and disturbed areas would be conspicuous.

New fencelines would be noticeable by any viewer for several hundred yards even when fenceposts are of earthtone colors. Buried water pipelines would create a temporary scar about 2 feet wide until vegetation became established.

Wilderness. Unavoidable adverse impacts which could result from livestock grazing and development projects are outlined in table 5-3. Specific project proposals which may occur in potential wilderness areas must be analyzed following the results of an accelerated wilderness inventory to determine the impacts to:

a. Primitive and unconfined recreation

b. Outstanding opportunities for solitude

c. Naturalness of the area

d. Ecological, geological, scientific, educational, scenic, and historical values

Livestock. As a general rule, the proposed action would not present major unavoidable adverse impacts to livestock management. However, some minor impacts would occur. Lower production from animals could result from forcing them onto different feed, into new surroundings and denying them access to regrowth generated in pastures grazed earlier in the year (Hormay, 1970). The consolidation of allotments would force some changes in current breeding practices. Permittees in consolidated

TABLE 5-3

Adverse Impacts Which Could Not Be Fully Mitigated

Project	Nature and Duration of Adverse Impacts to Wilderness Values
Spring	Minor short duration construction impact; no affect after several years.
Pipeline	Short duration construction; no impact after several years.
Well	Some impacts resulting from regular maintenance by vehicle and by pump engine noise.
Rainfall Catchment	Very little mitigation of impact is possible.
Tank or Trough	Adverse impact can be almost entirely mitigated at time of construction.
Reservoir	Any reservoir reconstruction would involve entry by heavy machinery and localized surface disturbance at the reservoir site.
Fence	Some low intensity visual impact would persist.
Cattle-guard	Nonapplicable; cattleguards would only be placed on existing roads.
Trail	Minor impact.
Seeding/ Chaining	Although some impacts to visual resources can be reduced, this type project would be very noticable as a man-created intrusion within a wilderness zone, and is not compatible with wilderness management objectives. In this region, the effects of chaining may take up to 100 years to overcome the affects of the intrusion.
Livestock Grazing	Trampling of vegetation near watering areas, sound and smell of animals and body waste in areas of high concentration. Degraded stream banks and riparian woody cover. Increase in flies in areas of high livestock concentration.

allotments would have to agree on establishing breeding seasons. The change in season-of-use would present some problems with ranch stability; these individuals would probably be forced to reduce herd size and/or feed livestock during this period of change.

CULTURAL RESOURCES

Recommended mitigating measures would minimize adverse impacts to cultural resources. However, damage to unknown sites and subsurface sites not discovered during project surveillance would be almost certain to occur. In cases where salvage mitigation is required, the impact would not be fully mitigated. Salvage of cultural resources is an avoidable adverse impact. Once excavated, a site is effectively destroyed and removed from future research considerations which may utilize new techniques.

SOCIOECONOMICS

As shown in table 5-4, all of the unavoidable adverse impacts would occur in the short term. Only the small scale operations are expected to decline in annual net income. With the proposed action, it is anticipated that this scale would receive negative returns. All operation scales would decline in capital value. With the existing management intensity and market conditions, these unavoidable adverse impacts are expected to force the less economically efficient operations to sell out to those more economical units.

TABLE 5-4

Unavoidable Adverse Impacts by Scale of Operation

	Total	Small	Medium	Large
Net Income[a]				
Total short-term net income change[b]	$ (318)	$ (6,395)	e	e
Total long-term net income change[c]	e	e	e	e
Capital Value[a d]				
Total short-term capital value change[b]	$(70,615)	$(20,021)	$(28,049)	$(22,545)
Total long-term capital value change	e	e	e	e

[a]Includes future as viewed 29 years from present with continuing existing management. It is based on predicted levels of forage production at that time.
[b]Short-term impacts are considered as being less than one complete grazing cycle and would occur upon implementation of the proposal.
[c]Long-term impacts are considered as occurring after one grazing cycle through the attainment of objective time frame (24 years) and the implementation interval (5 years).
[d]It is assumed values per Animal Unit Month (AUM) would not change.
[e]Positive or no change in value.

6

CHAPTER 6

RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

CHAPTER 6

RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

INTRODUCTION

This chapter discusses productivity of the environment which would be affected by the implementation and operation of intensive livestock management, i.e., allotment management plans, custodial management, and elimination of grazing. The proposed action would be a long-term, reversible commitment to losses of water, soil, vegetation, and wildlife resources. These resource losses would be committed or have been subjected to various tradeoffs in the short term, but nearly all can be reversed.

For the purpose of evaluating the effect of the proposed action over a longer time period to put the commitment of resources into perspective, different time frames are used in this chapter.

Short term refers to that period of time (20 to 30 years) during which most of the proposed action would be accomplished. Long term refers to the time after attainment of proposed objectives when subsequent effects of the proposed action would still impact the environment. Previously in Chapter 3, short-term impacts were considered to be one grazing cycle and long-term impacts were evaluated after objectives had been reached.

SOILS AND VEGETATION

During the first 5 years, approximately 5,251 acres of land would be disturbed by proposed range developments, including vegetative manipulation. However, within 20 to 30 years, these developments would improve the productivity of the area over present production levels and over time the losses incurred during the first 5 years would be recovered.

The proposed grazing systems would improve the vegetative productivity by an additional 5,622 animal unit months (AUMs) of livestock forage over present production in the long term. Benefits would occur in the form of increased vegetative cover and composition of forage species for wildlife and livestock. Increased infiltration and fertility would occur and erosion would decrease on 466,436 acres.

WILDLIFE

At the present time, there is sufficient forage for deer in most of the area. This situation is expected to continue. However, where the proposed action causes a long-term compositional change to grasses in important deer areas, a loss of desirable browse species and a decline in deer carrying capacity would result. If this occurs, adjustments in forage allocation and changes in the grazing systems may be needed to meet land use planning objectives.

Small mammals and birds would most likely benefit from the proposal due to the anticipated increase in cover, perennial grasses, and additional water developments. The proposed action would decrease the abundance of forbs and annuals, a desirable plant food for quail. However, the long-term adverse impact due to loss of forbs for quail would be partially offset by improved cover and additional water. The short term competition between cattle and the desert tortoise during the years the area is grazed in the spring could eventually lead to long-term decline of the tortoise population.

WATER RESOURCES AND FISHERIES

Water Resources. Ninety-three percent of the public lands in the ES area would have a 10 to 20-percent reduction of erosion in the long term (see Soils section). This reduction would apply to the watershed as a whole. This is expected to decrease the total sediment load in the drainages. Reduction in erosion immediately adjacent to the major water courses would be less, although estimated values are not available.

Fisheries. The proposed action could result in short-term (3 years), adverse impacts which would be identified during monitoring phases. In the long term, implementation of necessary mitigating measures would correct these situations.

CULTURAL RESOURCES

Inventory and assessment of prehistoric and historic resources directly affected by the proposal would provide immediate gains in scientific knowledge of the area and provide a data base for long-term gains.

Long-term loss of scientific data could occur if an inventory did not discover a surface site and it was subsequently destroyed during construction of proposed range developments.

LAND USE

The interrelationship between the Forest Service and Bureau of Land Management, explained in Chapter 1 relating to periods of use, would not be significantly affected by the proposed action in the short or long term. Basic seasons of use would remain similar to the now existing periods and would not disrupt or interfere with use made by the permittees on FS ranges. Although there might be a lag period of several weeks, either in the fall or summer, when BLM permittees would have to find additional pasturage, in all likelihood, their existing base ranching operations or rented pastures could provide this accommodation. In most instances, the reduced livestock numbers resulting from the implementation of the proposed action would not interfere with existing levels of use on FS lands.

The interrelationship between the BLM proposal and the cooperative effort with the permittees and SCS would not be drastically affected. In all likelihood, cooperative efforts between SCS and livestockmen to develop ranch plans to enhance their basic livestock operations on private holdings would be complementary. In situations where BLM requires reduced seasons of use, any enhancement of the productive capacity of the permittees' base properties created by a cooperative SCS ranch plan would be beneficial since the BLM permittee must find an additional source of feed for his livestock when they are off BLM ranges.

If lands should be withdrawn for the Bureau of Reclamation desalinization plant, then 545 acres out of a total of 3,523 contained within the Sandstone Mountain and Sand Hills allotments, along with 17 AUMs out of a total of 121, would no longer be available for livestock grazing. While overall management objectives for this ES would not be affected, such a withdrawal would present a conflict with proposed BLM management decisions and levels of grazing use for these two allotments.

If the proposed Warner Valley project should materialize, the locations of the reservoir site, powerplant site, and right-of-way corridors would affect the proposed grazing management in the Dome and

Fort Pierce Allotments. Approximately 4,872 acres of public land and 284 AUMs would be involved. In addition, the proposed alignment of the canal transporting water to the reservoir would cross the Sand Mountain Allotment, and would cause conflicts with the location of range developments.

Conflicts could arise on pasture alignment, improvement location, and grazing capacity. Existing range developments would also be affected.

Recreation. In the long run, some increases could be expected in wildlife populations resulting in better hunting opportunities and viewing but the change over existing opportunities would be limited. Opportunities would remain stable in the short term and increase slightly over time as improved topsoil conditions and rested pastures allow more successful reproduction of vegetation unique to the Hot Desert area.

Fencelines on Sand Mountain would restrict off-road-vehicle (ORV) users in both the short and long term.

In the LaVerkin Creek area, improved wildlife habitat would also improve related recreational values such as wildlife viewing and hunting.

Visual Resource. Some scenic changes would occur in the short term where fencelines, pipelines, reservoirs, etc., are proposed. In the long term these surface disturbances should not cause significant landscape changes.

Chaining would immediately result in a noticeable landscape change which would be visible for several years. The line of contrast between presently forested areas and chained grassy areas would be long-lived although chaining boundary design would minimize this long-term impact.

Wilderness. The reduction in primitive values resulting from installation of range improvements would not necessarily be permanent because the land could be returned to a near natural state. Table 5-3 outlines the nature and duration of potential impacts to wilderness areas.

Livestock. The proposal would not affect general land uses. In the short term, some ranching operations could use their private lands more intensively for forage production because of public land grazing permit

reductions. In the long term, stocking rates could be restored to present levels or exceed them when potential forage production is reached.

SOCIOECONOMICS

The proposed action would have some short-term adverse economic impacts on ranchers. Loss of base property qualifications would affect the value of their operation and their income flow. By providing a reliable forage supply, both the quantity and quality of livestock forage should improve in the long term and consequently improve the economic condition of livestock operations.

CHAPTER 7

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

CHAPTER 7
IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

INTRODUCTION

This chapter identifies the irreversible and irretrievable commitment of resources resulting from the proposed action. The term irreversible is defined as use that is incapable of being reversed: once something is initiated, it would continue. The term irretrievable means irrecoverable: once something is used, it is not replaceable.

Human resources used in implementing this proposal are considered to be irreversible and irretrievable. Monies, fuel, and materials used to develop the proposal are considered to be irretrievable.

Any archaeological, historical, scenic, or cultural values that may be inadvertently destroyed as a result of the proposed action are also considered to be irretrievable. Because development of the soil resource has occurred over hundreds of years, any soils eroded as a result of the proposed action are considered to be irretrievable. Except as noted above, all other resources involved in this proposal are retrievable and/or reversible. These include such resources as livestock, wildlife, and vegetation.

SOILS

Any topsoil that is lost by erosion as a direct result of construction activities and the first cycle of grazing would be irretrievable. However, long-term erosion losses under the proposed action are estimated to be reduced by 10 to 20 percent (Chapter 3).

VEGETATION

Under the proposed action, grazing by domestic livestock and wildlife would consume 34,250 animal unit months (AUMs) of forage annually (Appendix II). However, this is a renewable resource and is retrievable and reversible. Construction of range developments and vegetative treatments would remove approximately 5,251 acres of natural vegetation for the life of the improvements or treatments. This is considered to be an irretrievable but not irreversible commitment.

WILDLIFE

Wildlife populations are considered to be renewable resources and are retrievable, providing their habitat is not irreversibly altered. Wildlife habitat is considered renewable and reversible. Each year, 13,483 AUMs (Appendix II) of forage for wildlife would be consumed (see Vegetation section).

WATER RESOURCES AND FISHERIES

Water resources and fisheries are considered renewable and reversible. Healthy, viable fish populations are considered renewable resources and are retrievable providing their habitat is not irreversibly altered.

Populations of threatened, endangered, and sensitive fish species are not considered renewable even though initial habitat alterations would be reversible.

The proposed action would not irreversibly affect water quantity or quality and it would not irreversibly affect fisheries, including endangered or sensitive species.

CULTURAL RESOURCES

Proposed livestock grazing and range developments could disturb certain cultural resources. Once disturbed, historical and archaeological sites, as well as artifacts, are no longer available for future study. This could result in a data gap in the history of an area and would be considered an irretrievable commitment.

LAND USE

Recreation and Visual Resources. There should be no significant irreversible or irretrievable commitment of recreational or visual resources following implementation of the proposed action.

Wilderness. There would not necessarily be an irreversible or irretrievable loss of wilderness characteristics resulting from livestock grazing or construction and maintenance of range developments. However, the precedent of land use caused by installation of range improvements may result in more intensive range management practices in the future.

SOCIOECONOMICS

The major irreversible and irretrievable commitment would involve the costs associated with installation, maintenance, and administration of the proposal. Once the expenditures are made, those particular funds would not be available for other alternative public programs. An additional irretrievable commitment would include the labor associated with the proposal. Irretrievable losses of tax revenue would occur where reductions are made in livestock use.

CHAPTER 8

ALTERNATIVES TO THE PROPOSED ACTION

8

CHAPTER 8
ALTERNATIVES TO THE PROPOSED ACTION

INTRODUCTION

The following seven alternatives to the proposed action are addressed in this chapter:

1. Elimination of all livestock grazing
2. No action
3. Restricted grazing during growing season
4. Limited livestock grazing during first grazing cycle
5. Delayed implementation of the proposed action
6. Increased potential livestock utilization
7. Reduction of negative impacts on selected allotments

For all alternatives, stocking rates would not exceed the proper carrying capacity. Allotments proposed for elimination in the proposed action would not change in each of the alternatives; also, areas presently unalloted for grazing (Chapter 1) would not change in each alternative.

Standard mitigating measures identified in Chapter 1 and those specific resource measures addressed in Chapter 4 would apply to alternatives 3, 4, 5, 6, and 7.

The alternatives were selected to provide a broad analysis spectrum and range from complete elimination of grazing to high intensity management which would be achieved through additional development for livestock production. Figure 8-1 indicates the relative position of each alternative in this context and its relation to the proposed action.

The following discussion describes each alternative and its impacts by resource. A summary is also provided at the end of this chapter which compares the impacts of each alternative with those of other alternatives, as well as with the proposed action.

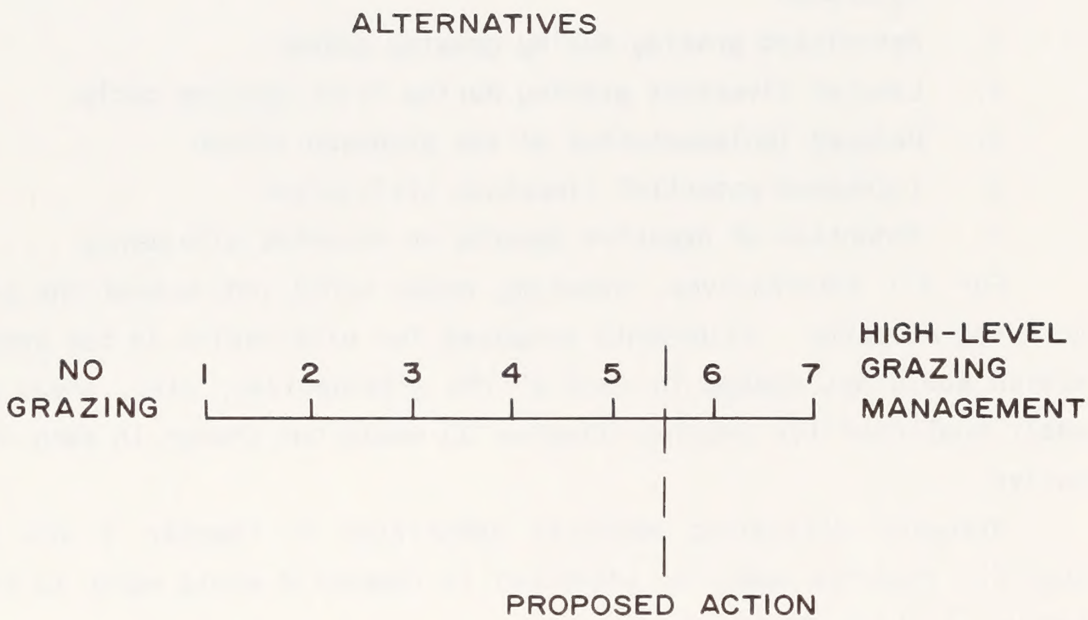


Figure 8-1

RANGE OF ALTERNATIVES BY DEGREE OF MANAGEMENT INTENSITY IN RELATION TO THE PROPOSED ACTION

ALTERNATIVE 1 - ELIMINATION OF ALL LIVESTOCK GRAZING

This alternative would eliminate domestic livestock grazing from public lands in Washington County. This alternative would reduce soil-, vegetation-, and wildlife-related negative impacts. The purpose would be to provide a faster recovery time for these resources as compared to the proposed action. This alternative presents a broad analytical base of comparison which when compared to the proposal, would be very low in grazing management intensity. To achieve complete elimination, State and private lands would have to be fenced from public land to exclude livestock. This would result in additional fencing and cost to all adjacent land owners, both to construct fences and maintain them. Range use supervision would be limited to control of livestock trespass in accordance with Federal regulations (43 CFR-9230). Management would be directed toward basic soil and vegetative resource protection.

No range developments would be completed. Only developments concerned with resource protection such as check dams, or resource enhancement such as wildlife habitat improvement, would be allowed. All vegetation would be available for wildlife, watershed protection, and recreation use.

Soils. Soil compaction, caused by livestock grazing and animal concentration around water sources, would be eliminated and water infiltration would increase on certain soils. Ground cover of vegetation and litter would gradually increase and soil loss from erosion would decrease in certain areas.

Because of the many factors affecting soil erosion plus the limited influence which livestock grazing has on significantly reducing these factors (Appendix V), it is expected that those areas having soils with a high ptential for erosion would continue to erode. Elimination of livestock grazing and the support facilities as proposed, would decrease erosion on other soils in the ES area, although the decrease would probably not be large.

Vegetation. Complete elimination of grazing on public land would result in a vegetative composition change favoring the naturally dominant species. Vegetative changes would tend toward ecological climax. Generally, perennial plants would increase. Because greater amounts of litter would accumulate, wildfire fuel would be more abundant. At year 24, the situation illustrated in table 8-1 could be expected. Interpretations of Soil Conservation Service (SCS) ecological site data show that potential forage production under ecological climax conditions is estimated to be 48,804 animal unit months (AUMs) (Appendix I). Livestock forage production under this alternative would increase toward the potential but would not be available for livestock grazing.

TABLE 8-1

Expected Situation in Year 24
Under Alternative 1

Livestock Forage Condition Acres	Trend	Livestock Forage Production	Possibility of Reaching Potential Livestock Production
529,564 Improving	Up	No livestock forage production	Potential level of production reached but not consumed by livestock

Wildlife. Because this alternative would result in the recovery of the vegetation, it would be a beneficial impact. The increased production would be available for deer, quail, desert tortoise, and all other wildlife. An increase in forage would not necessarily result in an increase in wildlife populations because forage is not always the limiting factor. Once a certain limit of available forage was reached, the animals may become limited by other factors such as available space or weather, and the excess forage would go unused by wildlife.

The improvement of mule deer winter range on public land does not always require the total elimination of all livestock grazing since it is felt that moderate use by cattle may help to hold a favorable balance between shrubs and grasses. However, in small areas where winter range is critical to deer, livestock use could be eliminated, if necessary, to reduce competition for forage.

This alternative would also have some detrimental impacts. Water sources developed for livestock and used by wildlife would be lost unless wildlife funding and personnel were made available to operate and maintain them.

The additional fence needed to exclude livestock from public land would increase hazards to deer movements, and fence mortality would increase over the present. Although these fences built by BLM would be constructed to Bureau of Land Management (BLM) specifications, some fences on private land boundaries may not meet wildlife needs.

Water Resources. Reduced demand upon groundwater supplies as a result of elimination of grazing would allow a small amount of additional water to be made available for other uses. Recharge and infiltration rates would increase somewhat.

Riparian vegetation would be expected to show marked improvement; therefore, sedimentation and water quality would be expected to improve. However, improvement of fisheries' habitat would be limited in certain areas due to scouring from continued high-intensity storms, dewatering from irrigation, and sedimentary and chemical deposition from irrigation return flows. Bacteria levels would also decline.

Cultural Resources. Removal of all livestock from public land would have a positive effect on cultural resources. Ground-disturbing projects, trampling and secondary sheet erosion impacts would no longer require mitigation. Project-oriented inventories would not be carried out, and the data base would not be increased and improved until such time as inventories would be conducted for other reasons.

Recreation. Increased plant diversity could provide improved botanical sightseeing value. Off-road vehicle (ORV) use in authorized areas would

not be restricted because no pasture fences on public land would be required. Improved riparian habitat would improve wildlife viewing opportunities. Many livestock operators could close private access roads to public recreational use.

Visual Resources. Visual resources would primarily show a slow but steady change as vegetative cover and composition changed on public land. Increased plant diversity would create more irregular texture, pattern, and color combinations than are now seen on the landscape.

Construction and maintenance of additional fencing would create erratic fencelines on the landscape similar to those that now exist.

Wilderness. The additional fences could adversely affect potential wilderness areas, however, there would be highly favorable impacts to primitive and unconfined recreation, outstanding opportunities for solitude, return to naturalness of the area, and enhancement of the ecological, scenic, and historical values.

Livestock. This alternative would have a serious impact on the livestock operators in the county. If this alternative was implemented, approximately two-thirds of the operators in the county would lose 28,905 AUMs of licensed qualifications. Very few operators, if any, could continue with the elimination of public land forage for 5 months. Most livestock would be sold and the operators would rely on alternative sources of income.

Socioeconomics. Although livestock grazing in Washington County is currently playing a decreasing economic role in the county, the elimination of all livestock grazing could seriously modify the current situation.

The rural population would not decrease appreciably as a result of this alternative because few of the current operators are directly dependent upon livestock for their total income.

Some employment trends could change if this alternative was implemented. The total personal and per capita income would not change significantly.

Ranch Economics. Since operators would need additional sources of forage, costs of private, rental, and lease pastures would increase. Where fencing is necessary, additional costs would be incurred.

Ranch Operations Utilizing Public Land. The elimination of grazing on public land would alter the current operation of the 108 permittees. Because the average use period on public land is 5 months, it is not conceivable that alternative pasture and/or feeding could maintain all the operations. The total net income loss per year would approximate $40,000 (Socioeconomics section, Chapter 2); the loss in capital value could exceed $255,000. These figures do not represent losses if the operation were completely eliminated but only represent the economic values they generate while on public land.

Small Operation. With the elimination of grazing on public land, 63 operators together would lose approximately $6,400 in net income. The loss in capital value would be in excess of $56,000.

Medium Operation. The medium scale would represent the largest loss if grazing on public land was discontinued. Thirty-five operators together would lose over $20,000 in annual net income and $120,000 in the capital value of the permits. Some of these operators who depend on livestock income for their livelihood would be seriously impacted.

Large Operation. The 10 large operators would be impacted adversely by the elimination of grazing on public land. This elimination would result in a combined loss of $13,000 in annual net income and over $78,000 in capital value of the permits.

Public Attitudes and Values. This alternative would affect most of the values, goals, and attitudes held by livestock operators. With the loss of the grazing privileges the resale goals of the unit would be greatly reduced. Rates of land appreciation would change. In most cases, income derived from the operation would not satisfy the wants and needs of the operator.

Existing urban values would not change significantly. Most urbanists would feel the action would diminish opportunities for the rural population.

ALTERNATIVE 2 - NO ACTION

This alternative allows for continuing the present level of livestock management. This alternative would reduce negative impacts associated with the proposed range developments. Compared to the proposed action, this alternative would not provide for rapid vegetative recovery, but would slow the deteriorating resource conditions. Grazing management intensity would be low; the only change would be to reduce the livestock stocking rates from 28,905 AUMs to 19,759 AUMs. There would still be the same number of allotments as under present management. No range developments other than those projects necessary to arrest deteriorating range conditions through range rehabilitation, protection, and improvement would be completed. Management of other resources would not be restricted.

Soils. Under this alternative, all allotments proposed for custodial management or elimination of grazing would be managed the same as under the proposed action and expected changes in erosion and infiltration rates would be similar.

On all other areas, compaction would not change or could decrease slightly from the present situation because of proposed reduction in animal numbers.

Erosion rates are expected to change very little from the present situation. Steep and erodable soils would continue to erode. Stream banks and riparian areas would continue to deteriorate from livestock use and concentration.

Some productive potential would eventually be lost, affecting the ability of the soil to support plants for cover.

Vegetation. This alternative would not change the vegetative situation a great deal. The reduction in stocking rates would allow for maintenance or improvement in certain areas. This improvement would be limited to areas furthest from water and not as easily accessible to livestock. Areas that receive the heaviest use would continue to decline from grazing during the growing season. Table 8-2 shows a detailed impact

TABLE 8-2

Alternative 2: Impacts on Vegetation

Grazing System or Allotment	Area Affected	Average Present Situation: Desirable Plant Vigor[a]	Average Present Situation: Apparent Trend	Season of Use	Percent Current Growth Used (Palatable Species)	Resulting Impacts	Length of Impact	Livestock Forage Condition	Apparent Trend	Projected Change in Livestock Forage Production in 24 years (AUMs)	Percent of Existing Forage Production Levels (AUMs)	Impact Summary
Continuous grazing	All	Poor	Down	Fall/ winter/ spring (October - May)	50	Cool season grass, and warm season grass - decrease in vigor, seed production, and plant establishment. Forbs and annual grass - increased. Woody plants - decrease in vigor, seed production, and plant establishment of palatable; increase in unpalatable. Plant composition change - favors increase of annuals and unpalatable species; warm season grasses would be favored over cool season but both would decline. Litter accumulation - poor. Riparian vegetation - heavily used areas would continue to decline.	Short term, Long term	Declined	Down	Decreased from 14,265 to 12,125	85	Negative
Continuous grazing	All	Poor	Down	Yearlong	50	Cool season grass, warm season grass, and riparian vegetation - decline. Forbs and annual grass - increased. Woody plants - decline of palatable; increase of unpalatable. Plant composition changes - favors unpalatables and annuals. Litter accumulation - poor.	Short term, Long term	Declined	Down	Decreased from 3,867 to 3,287	85	Negative
Season-long (fall/winter)	All	Poor	Down	October - March	50	Cool season and warm season grass - gain vigor, seed production, and plant establishment. Forbs and annual grass - slowly decreasing. Woody plants - loss of vigor, slowly decline. Plant composition change - favors perennial grass; browse decrease slightly; annuals and unpalatable species decrease. Litter accumulation - good. Riparian vegetation - decline at the watering places.	Short term, Long term	Improved	Up	Maintained at 28	100	Positive

[a]Desirable pant vigor generally applies to most of the allotment that is currently used by livestock, although localized exceptions exist. This is a visual observation from one point in time. Vigor estimates were included because it influences the kind and degree of impact and also affects the possibility of reaching potential forage production.

NOTE: Comparison based on existing condition and forage production levels (Appendix VIII). Season of use for existing allotments was grouped based on table 2-15.

(continued)

TABLE 8-2 (continued)

Grazing System or Allotment	Area Affected	Average Present Situation: Desirable Plant Vigor[a]	Average Present Situation: Apparent Trend	Season of Use	Percent Current Growth Used (Palatable Species)	Resulting Impacts	Length of Impact	Livestock Forage Condition	Apparent Trend	Projected Change in Livestock Forage Production in 24 years (AUMs)	Percent of Existing Forage Production Levels (AUMs)	Impact Summary
Season-long (summer)	All	Fair	Static	June - September	50	Cool season grass, and forbs and annual grass - increased. Warm season grass, and woody plants - reduced. Plant composition change - favors increase of cool season grass and annuals; decrease of warm season grass and browse. Litter accumulation - fair. Riparian vegetation - heavy use at watering places; most will show decline.	Short term, Long term	Very little	Static	Maintained at 462	100	Unchanged
Rotation with rest system (Gooseberry, Canaan Gap)	1/3	Fair	Static	Fall/ winter	75	Cool season grass, warm season grass, and forbs and annual grass - no change. Woody plants - loss of vigor. Plant composition change - favors perennial grass, then forbs and annuals and browse species last. Unpalatable species not impacted. Litter accumulation - reduced. Riparian vegetation - heavy concentration around water would cause trampling damage and loss of vigor.	Short term	....	......	....	....	....
	1/3	Fair	Static	Spring	75	Cool season grass, warm season grass, forbs and annual grass, and woody plants - loss of vigor, seed production, and plant establishment. Plant composition change - favors increase of unpalatable species; decrease in order: cool season grasses, warm season grasses; browse species, and annuals and forbs. Litter accumulation - reduced. Riparian vegetation - trampling damage and loss of vigor.	Short term	....	......	....	....	....

[a]Desirable plant vigor generally applies to most of the allotment that is currently used by livestock although localized exceptions exist. This is a visual observation from one point in time. Vigor estimates were included because it influences the kind and degree of impact and also affects the possibility of reaching potential forage production.

(continued)

TABLE 8-2 (continued)

Grazing System or Allotment	Area Affected	Average Present Situation: Desirable Plant Vigor[a]	Average Present Situation: Apparent Trend	Season of Use	Percent Current Growth Used (Palatable Species)	Resulting Impacts	Length of Impact	Livestock Forage Condition	Apparent Trend	Projected Change in Livestock Forage Production in 24 years (AUMs)	Percent of Existing Forage Production Levels (AUMs)	Impact Summary
	1/3	Fair	Static	Rest	0	Cool season grass, warm season grass, and woody plants - gain vigor; produce seed; establish young plants. Forbs and annual grass - decrease in number. Plant composition change - favors increase in perennial grass then browse; decrease in forbs and annuals. Litter accumulation - increased. Riparian vegetation - increased in vigor.	Short term	....	......	....	....	....
Accumulative Treatments	Total Unit	Identical to all three treatments shown above as typical		Fall/ winter/ spring (October - May)	50	Cool season grass - gain vigor; produce seed; establish young plants. Warm season grass - same as cool season except would have opportunity for some growth after grazing that cool season would not. Forbs and annuals - natural competition would reduce most annuals in favor of perennials; annual forbs would decrease but perennial forbs may increase. Woody plants - these plants would stay about the same but may decrease during unfavorable moisture years. Plant composition change - favors increase of warm season grass, then cool season grass. Litter accumulation - increased. Riparian - heavily used areas would continue to decline in vigor.	Long term	Improved	Up	Maintained at 557	100	Positive

[a]Desirable plant vigor generally applies to most of the allotment that is currently used by livestock although localized exceptions exist. This is a visual observation from one point in time. Vigor estimates were included because it influences the kind and degree of impact and also affects the possibility of reaching potential forage production.

(continued)

TABLE 8-2 (continued)

Grazing System or Allotment	Area Affected	Average Present Situation: Desirable Plant Vigor[a]	Average Present Situation: Apparent Trend	Season of Use	Percent Current Growth Used (Palatable Species)	Resulting Impacts	Length of Impact	Livestock Forage Condition	Apparent Trend	Projected Change in Livestock Forage Production in 24 years (AUMs)	Percent of Existing Forage Production Levels (AUMs)	Impact Summary
DEFERRED SYSTEM												
Little Creek	1/2	Poor	Down	June - October	80	Cool season grass and warm season grass - loss of vigor, seed production and plant establishment. Forbs and annual grass - palatable decrease; unpalatable increase. Woody plants - decrease in vigor. Plant composition change - favors increase of unpalatable forbs and annuals. Litter accumulation - reduced. Riparian vegetation - loss of vigor.	Short term, Long term	Declined	Down	Decreased from 314 to 268 for entire allotment	85	Negative
	1/2	Poor	Down	November - May	80	Cool season grass, warm season grass, and woody plants - decreased. Forbs and annual grass - increased. Woody plants - decreased. Plant composition change - favors increase of annuals and unpalatable species. Litter accumulation - reduced. Riparian vegetation - loss of vigor.	Short term, Long term	Declined	Down	....	Poor	Negative
Dagget Flat	1/2	Poor	Down	June - July	60	Cool season grass - gain of vigor, seed production, and plant establishment. Warm season grass, and woody plants - loss of vigor, seed production, and plant establishment. Forbs and grass, and litter accumulation - not much change. Plant composition change - favors increase of cool season grass; decrease in warm season grass and browse. Riparian vegetation - reduced vigor; trampling damage.	Short term, Long term	Declined	Down	Decreased from 266 to 226 for entire allotment	85	Negative

[a]Desirable plant vigor generally applies to most of the allotment that is currently used by livestock although localized exceptions exist. This is a visual observation from one point in time. Vigor estimates were included because it influences the kind and degree of impact and also affects the possibility of reaching potential forage production.

(continued)

TABLE 8-2 (concluded)

Grazing System or Allotment	Area Affected	Average Present Situation: Desirable Plant Vigor[a]	Average Present Situation: Apparent Trend	Season of Use	Percent Current Growth Used (Palatable Species)	Resulting Impacts	Length of Impact	Livestock Forage Condition	Apparent Trend	Projected Change in Livestock Forage Production in 24 years (AUMs)	Percent of Existing Forage Production Levels (AUMs)	Impact Summary
	1/2	Poor	Down	August - September	60	Cool season grass - increased. Warm season grass, and woody plants - decreased. Forbs and annual grass - no change. Plant composition change - favor increase of cool season grass; decrease of palatable browse and warm season grass. Litter accumulation - not much change. Riparian vegetation - decline in vigor.	Short term, Long term	Declined	Down	Decreased from 266 to 226 for entire allotment	85	Negative

[a]Desirable plant vigor generally applies to most of the allotment that is currently used by livestock although localized exceptions exist. This is a visual observation from one point in time. Vigor estimates were included because it influences the kind and degree of impact and also affects the possibility of reaching potential forage production.

analysis of the no action alternative which reflects the existing situation (Chapter 2). Except as noted in table 8-2, most allotments are used continuously each year and at the same season. Table 2-15 shows the existing season of use by allotment. Most of the vegetation is presently declining and would continue to decline but at a slightly slower rate than under present grazing intensity. Three allotments, Little Plain, Canaan Gap, and Goosberry, would show improved condition with an increase in perennial grasses. Seventeen allotments, with a total of 30,604 acres, would remain unchanged while the other 483,073 acres would continue to decline. Palatable species such as Brigham tea and curly grass would lose vigor and decline in density. Unpalatable species such as snakeweed and annuals would increase. At year 24, the situation in table 8-3 is expected. It is expected that livestock forage production would be reduced 14 percent from the existing production level of 19,759 AUMs (Appendix VIII) to 16,953 AUMs.

TABLE 8-3

Expected Situation in Year 24 Under Alternative 2

Livestock Forage Condition Acres		Trend	Livestock Forage Production	Possibility of Reaching Potential Livestock Production
15,887	Improving	Up	Increasing	Good
30,604	No change	No change	No change	....
483,073	Declining	Down	Declining	Poor

<u>Wildlife</u>. With this alternative, overall wildlife habitat would decline from the present situation but at a slightly slower rate because of the reduction in use. Perennial grasses and browse would decrease in areas of heavy livestock use, lowering the quality of habitat for deer, small

mammals and birds. Areas would improve where livestock use is reduced because of suitability. The net impact on quail habitat is expected to be insignificant except in riparian areas used by livestock where it would decline. The desert tortoise habitat would continue to decline.

Water Resources. This alternative would create a gradual increase in sediment levels over the long term due to the overall downward trend in range condition and riparian habitat areas.

Fisheries. Where fisheries' habitat would be exposed to continued livestock grazing and concentration, the habitat would be subjected to uncontrolled utilization of riparian vegetation and stream bank deterioration through trampling, with no opportunities provided for improved habitat conditions. No data are available to show the habitat or population trends of fisheries in the ES area. However, based on past and current studies on determination of impacts on fisheries from livestock grazing, it can be readily assumed that with a continued decline in riparian and aquatic habitat conditions, a corresponding decline and/or elimination of fish populations can be expected.

Cultural Resources. The damage to any archaeological sites being trampled by livestock would continue. Since an intensive cultural resources inventory has not yet been completed, the number and significance of sites currently being adversely impacted by livestock trampling is unknown. Sheet erosion, as a result of decreased cover, would continue to damage any sites that are being washed away and redeposited.

Recreation. There would not be a significant change in recreational activity in the area.

Visual Resources. There would be no change in visual resources.

Wilderness. Since this alternative would continue negatively impacting the ecological, scenic, and historical values and naturalness of the area through the continued degradation of vegetation and soils, it would result in loss of wilderness areas.

Livestock. This alternative would reduce livestock numbers to the carrying capacity where necessary. Current livestock production characteristics would remain the same. Of the total 84 allotments, 60 (71

percent) would continue to decline. This would require additional reductions in the future.

Under this alternative, livestock production would continue to decline. Stability of the livestock industry in the county would not improve. Eventually, some of the operators would be forced out of the livestock business.

Socioeconomics. The impact of this alternative would be very similar to the economic effect of the proposed action in the short term.

In time, this would shift the current scale proportions to those operations with the higher efficiencies. Some of the less efficient operators could continue, but would require additional income from outside sources.

Except for the reduction of livestock numbers, this alternative would be more socially acceptable to most of the livestock operators than the proposed action.

ALTERNATIVE 3 - RESTRICTED GRAZING DURING GROWING SEASON

This alternative would prohibit grazing during the growing season, March 1 through May 31. The purpose of this alternative would be to provide for a moderate intensity of grazing management that would result in a rapid rate of recovery of soil and vegetative resources. The time needed to reach potential livestock forage levels would be reduced compared to the proposed action. The existing management practices would remain unchanged. There would be no change in existing allotment boundaries or additional improvements until there was significant improvement in the condition and trend of available livestock forage.

Allotment Management Plans would be developed at a rate of one or two each year but there would be no grazing during the growing season. AMPs would include authorized number and class of livestock, season of use, management objectives, evaluation studies, and range developments, and would be similar to those developed in the proposed action.

Soils. Implementation of this alternative would have a positive impact on the soil resource.

Eliminating spring grazing and reducing livestock numbers would increase ground cover of vegetation and litter on all allotments.

Eliminating livestock use during the growing season would reduce soil erosion. However, because some adjustments were made in the proposed seasons of use and stocking rate to avoid use during the spring, four allotments would be grazed more intensively during critical winter and summer compaction periods than under the present situation. Compaction would increase on Herd House, Veyo, Black Canyon, and Desert Inn Allotments.

Erosion would decrease and infiltration would increase on all allotments except the four listed above. Conditions on those four would show very little change.

Changes would take place at a more rapid rate than in the proposed action. Because of the expected slight reduction in soil losses on most allotments, very little change in the productive potential would occur.

Vegetation. Table 8-4 shows the proposed changes in season. Because grazing use would be reduced considerably during the critical growing period, the vegetation would respond favorably to this treatment beginning the first year. Table 8-5 details the anticipated impacts.

TABLE 8-4

Alternative 3 - Proposed Season Changes

Allotment	Average Existing Season of Use Period[a]	Proposed Action Season of Use	Alternative 3 Season of Use
INTENSIVE MANAGEMENT			
Alger Hollow	9/16-5/31	11/16-5/31	11/16-2/28
Apex Slope	12/20-2/19 - 4/1-4/30	12/20-2/19 - 4/1-4/30	12/20-2/19
Beaver Dam Slope	11/16-5/31	12/1-5/31	12/1-2/28
Big Mountain	5/1-10/7	5/1-10/7	6/1-10/7
Boomer Hill	12/16-5/15	12/1-2/28	12/1-2/28
Boot Spring	3/1-5/15	11/1-2/28	11/1-2/28
Bull Mountain	Yearlong	8/1-5/31	8/1-2/28
Central	10/15-5/31	11/1-4/30	11/1-2/28
Coalpits	5/1-5/31 - 10/16-12/15	10/16-12/15	10/16-12/15
Cougar Canyon	5/1-9/30	5/1-9/30	6/1-9/30
Curly Hollow	11/16-5/15	11/16-5/22	11/16-2/28
Dagget Flat	6/1-9/23	6/1-9/30	6/1-9/30
Desert Inn	Yearlong	11/16-5/15 - 6/1-8/31	11/16-2/28 - 6/1-8/31
Dome	11/1-5/15	1/1-4/30	1/1-2/28
Fort Pierce	Yearlong	11/1-5/31	11/1-2/28

[a]Since the proposed allotment contains a number of existing allotments with differing seasons of use, the dates noted are average. They encompass the actual use period and indicate the earliest and latest period of use over the entire allotment.

(continued)

TABLE 8-4 (continued)

Allotment	Average Existing Season of Use Period[a]	Proposed Action Season of Use	Alternative 3 Season of Use
Gooseberry	11/1-5/31	11/1-5/31	11/1-2/28
Grafton	11/1-5/31	12/1-5/31	12/1-2/28
Gunlock	10-/16-5/31	10/16-5/31 - 10/1-2/28	10/16-2/28 - 10/1-2/28
Herd House	1/9-4/24	12/1-2/28	12/1-2/28
Hurricane	10/16-5/15	10/16-5/15	10/16-2/28
Hurricane Fault	10/16-5/31	10/16-5/15	10/16-2/28
Hurricane Mesa	Yearlong	12/1-2/28	12/1-2/28
Jackson Wash	11/16-5/31	11/16-5/31	11/16-2/28
Land Hill	2/1-5/31	12/1-2/28	12/1-2/28
Little Creek	Yearlong	11/16-5/30	11/16-2/28
Mesa	8/1-4/30	12/1-2/28	12/1-2/28
Minera Wash	3/1-5/31	11/1-1/31 - 3/1-5/31	11/1-2/28
Red Cliffs	1/16-5/23	1/16-5/15	1/16-2/28
Sand Mountain	10/1-5/31	10/16-5/15	10/16-2/28
Sandstone Mountain	3/1-5/31	3/1-5/31 - 9/1-11/30	9/1-11/30
Santa Clara Creek	2/16-5/31 10/16-12/15	12/1-2/28	12/1-2/28
Scarecrow Peak	11/1-5/31	11/1-5/31	11/1-2/28
Short Creek	Yearlong	12/1-5/31	12/1-2/28
Smith Mesa	Yearlong	Yearlong	6/1-2/28
Toquerville	12/21-5/15	1/1-5/15	1/1-2/28
Trail	12/1-5/31	3/16-5/15	12/1-2/28

[a]Since the proposed allotment contains a number of existing allotments with differing seasons of use, the dates noted are average. They encompass the actual use period and indicate the earliest and latest period of use over the entire allotment.

(continued)

TABLE 8-4 (continued)

Allotment	Average Existing Season of Use Period[a]	Proposed Action Season of Use	Alternative 3 Season of Use
Twin Peaks	Yearlong	4/1-12/31	6/1-2/28
Veyo	11/1-5/31	11/16-5/31	11/16-2/28
Virgin	11/1-5/15	11/1-5/31	11/1-2/28
Warner Ridge	12/1-5/31	12/1-5/31	12/1-2/28
Washington	10/16-4/30	12/1-2/28	12/1-2/28
White Dome	10/16-5/31	1/1-2/28	1/1-2/28
CUSTODIAL MANAGEMENT			
Airport	10/16-5/15	10/16-5/15	10/16-2/28
Black Canyon	3/16-9/15	3/16-9/15	6/1-9/15
Box Canyon	3/1-5/15	3/1-5/15	12/1-2/28
Cinder Mountain	10/16-5/15	10/16-2/28	10/16-2/28
Dalton Wash	11/1-5/15	11/1-4/30	11/1-2/28
Lamoreaux	5/1-10/15	5/1-10/15	6/1-10/15
Little Plain	11/1-2/28	11/1-2/28	11/1-2/28
North Grafton	2/1-4/30	2/1-4/30	12/1-2/28
Red Butte	Yearlong	5/1-10/31	6/1-10/31
Rock Spring	6/1-10/15	6/1-9/30	6/1-9/30
Sand Hills	12/1-5/15	12/1-5/15	12/1-2/28
Sand Wash	10/16-5/31	11/15-5/31	11/15-2/28
Stout	10/15-5/15	1/1-2/29	1/1-2/28
Yellow Knolls	10/16-5/31	10/16-5/31	10/16-2/28
Custodial Portions Within Intensive Management			
Coalpits	5/1-5/31 - 10/16-12/15	5/1-5/31 - 10/16-12/15	10/16-12/15
Fault	12/16-4/30	12/16-4/15	12/16-2/28

[a]Since the proposed allotment contains a number of existing allotments with differing seasons of use, the dates noted are average. They encompass the actual use period and indicate the earliest and latest period of use over the entire allotment.

(continued)

TABLE 8-4 (concluded)

Allotment	Average Existing Season of Use Period[a]	Proposed Action Season of Use	Alternative 3 Season of Use
Herd House	1/9-4/24	3/1-5/31	12/1-2/28
Hurricane	10/16-5/15	Yearlong	10/16-2/28
Hurricane Mesa	Yearlong	Yearlong	12/1-2/28
Mesa	8/1-4/30	5/1-10/15	6/1-2/28
Scarecrow Peak (Snow Holding Pasture)	NA	5/15-5/31	6/1-10/30
Virgin (Mountain Dell)	1/1-5/15	10/1-10/30	10/1-10/30
White Dome	10/16-5/31	10/16-5/31	10/16-2/28
ELIMINATION OF GRAZING			
LaVerkin Creek	3/16-6/15	....	....
Pace Knoll	NA	....	....
Pintura Seeding	1/1-5/15	....	....

[a]Since the proposed allotment contains a number of existing allotments with differing seasons of use, the dates noted are average. They encompass the actual use period and indicate the earliest and latest period of use over the entire allotment.

Generally, this treatment favors an increase in both warm and cool season grasses, although cool season grasses would benefit most. Annuals, forbs, and browse species would receive more competition from grasses. Warm season grass may decrease in areas where grazing continues from June 1 to October 15. The identified potential production should be reached by the target date although a few allotments having plants in poor vigor would require a longer time period to reach potential. All allotments would respond favorably to this alternative.

At year 24, the situation illustrated in table 8-6 is expected.

TABLE 8-5

Alternative 3: Impacts on Vegetation

Grazing System or Allotment	Area Affected	Average Present Situation: Desirable Plant Vigor[a]	Average Present Situation: Apparent Trend	Season of Use	Percent Current Growth Used (Palatable Species)	Resulting Impacts	Length of Impact	Livestock Forage Condition	Apparent Trend	Projected Change in Livestock Forage Production (AUMs)	Percent of Potential in 24 years	Impact Summary
Continuous grazing (44 allotments)	406,373	Poor	Down	Winter (end of October to February)	50	Cool season and warm season grasses - gain vigor, seed production and plant establishment. Forbs and annual grass - reduced. Woody plants - palatable species lose vigor, ability to produce seed; unpalatable would increase. Plant composition change - favors increase of perennial grasses; decrease in annuals, forbs, and browse species. Litter accumulation - increased. Riparian vegetation - improved generally; small areas of high livestock concentration would decline.	Short term, Long term	Improved	Up	Increased from 16,323 to 22,448	100	Positive
Continuous grazing (12 allotments)	109,686	Poor	Down	Summer/fall/ winter (1st of June to February)	50	Cool season grasses - increase in vigor, seed production and plant establishment. Warm season grasses - change very slight in any direction but may favor decrease. Forbs and annual grass - decrease in vigor and number. Woody plants - decrease in vigor. Plant composition change - favors increase of cool season grass; decrease of forbs, annuals, and palatable browse. Litter accumulation - no change. Riparian vegetation - at preferred watering places the vegetation would decline; less preferred would improve.	Short term, Long term	Improved	Up	Increased from 3,392 to 5,478	100	Positive

[a]Desirable plant vigor generally applies to most of the allotment that is currently used by livestock although localized exceptions exist. This is a visual observation from one point in time. Vigor estimates were included because it influences the kind and degree of impact and also affects the possibility of reaching potential forage production.

NOTE: Comparison based on existing condition. Allotments and respective season of use (Table 8-4) grouped on the basis of falling within months indicated above. Existing livestock forage production determined from Appendix I.

(continued)

TABLE 8-5 (concluded)

Grazing System or Allotment	Area Affected	Average Present Situation: Desirable Plant Vigor[a]	Average Present Situation: Apparent Trend	Season of Use	Percent Current Growth Used (Palatable Species)	Resulting Impacts	Length of Impact	Livestock Forage Condition	Apparent Trend	Projected Change in Livestock Forage Production (AUMs)	Percent of Potential in 24 years	Impact Summary
Elimination of grazing (LaVerkin Creek Allotment)	10,716	Poor	Static	None	0	Cool and warm season grasses and woody plants - increase in vigor. Forbs and annual grass - decrease in number. Plant composition change - favors natural competitors, perennial grass and browse. Litter accumulation - increase. Riparian vegetation - increase in vigor.	Long term	Improved	Up	Improved but not consumed by livestock	None	Positive
Pace Knoll	1,885	....	......	....	...	No change from present condition.	....	....	...	....	....	....
Pintura Seeding	904	....	......	....	...	No change from present condition.	....	....	...	....	....	....

[a]Desirable plant vigor generally applies to most of the allotment that is currently used by livestock although localized exceptions exist. This is a visual observation from one point in time. Vigor estimates were included because it influences the kind and degree of impact and also affects the possibility of reaching potential forage production.

TABLE 8-6

Expected Situation in Year 24 Under Alternative 3

Livestock Forage Condition Acres		Trend	Livestock Forage Production	Possibility of Reaching Potential Livestock Production
526,775	Improving	Up	Increasing	Good
0	Declining	......	....	....
2,789	No change	Static	Available but not consumed by live-stock	No potential production identified

<u>Wildlife</u>. This alternative would also lower the carrying capacity for deer by causing a decline in palatable browse. Riparian vegetation would continue to decline in areas of livestock concentration and loss of habitat for quail, small mammals, birds, reptiles and amphibians would continue. Production of annuals and forbs used by quail would be reduced in the long term due to natural competition from perennial species. Overall, cover would increase, which would benefit quail and the increased perennial grasses would benefit small mammals and birds.

This alternative would reduce the competition for spring forage between livestock and tortoises in the Beaver Dam Slope Allotment. Competition would not be eliminated because the cattle would still utilize the earliest annuals prior to March 1. This alternative would improve the situation over the present condition and also over the proposed action.

<u>Water Resources</u>. This alternative could create a gradual decrease in sediment levels over the long term due to the overall upward trend in range condition and increased vegetative cover. Water quality would improve.

Fisheries. This alternative would provide a benefit in terms of allowing rest to riparian vegetation during the critical growing period. This alternative could alleviate a problem encountered when livestock are permitted to trample stream banks during a period of time in which soil moisture content is high on adjacent areas, a situation conducive to soil compaction.

This short-term benefit would not be expected to outweigh impacts of concentrating livestock during other times of the year when excessive utilization of riparian vegetation and stream bank trampling would occur. Woody riparian vegetation would be under stress and would not respond. Fish populations could be expected to decline further with continued riparian habitat deterioration. In this situation, impacts would be similar to those discussed in Chapter 3.

Cultural Resources. This alternative would produce the same impacts as the proposed action, except sheet erosion would decrease slightly, reducing the threat of sites being exposed to possible damage.

Recreation. Overall, achievement of improved range and watershed conditions that affect recreational resources would occur sooner than in the proposed action. Implementation of this alternative would result in improvement of several recreational resources such as botanical sightseeing. Positive impacts would generally be of the same nature as those discussed under the proposed action.

Visual Resources. The landscape changes as described in the proposed action would occur sooner under this alternative.

Wilderness. The effect of this alternative on wilderness values would be more favorable than the proposed action because of the rapid rate of soil and vegetative resource recovery. The greatest changes would be to the ecological and scenic values. All other wilderness values would be affected in a manner similar to the proposed action.

Socioeconomics. With the removal of all livestock from public land during the spring nearly all of the operations would be impacted. The exception would be four allotments (identified in the Soils Section of this alternative) with a total of 209 cattle and 944 AUMs.

The average operation currently utilizes public land for 5 months, 3 of which are spring months. The elimination of livestock grazing for these 3 months would significantly alter the operations. For maximization of this public land forage, total herd size would increase during the 2 months on public land. For the 3 spring months alternative forage would be required for the expanded herd. Because no additional pasture is available to maintain this expanded herd, an annual hay bill of $442,000.00 for the 3 months would be expected. This would not be economically feasible with existing market conditions.

ALTERNATIVE 4 - LIMITED LIVESTOCK GRAZING DURING FIRST GRAZING CYCLE

This alternative proposes that during the first full cycle of grazing, livestock grazing use would be limited to the capacity of the pasture with the lowest carrying capacity. The purpose of this alternative would be to reduce short-term impacts to soils, vegetative, and wildlife resources. It would provide for a faster resource recovery rate. The stocking rate would be reduced and the balance of the Base Property Qualifications would be held in suspended nonuse. After evaluation of the grazing systems at the end of one cycle, the stocking rates would be increased toward those prescribed in the proposed action as additional forage becomes available. Full implementation of the proposed action would follow after the forage trend is shown to be going up and the range forage condition shows improvement. This alternative involves exactly the same grazing system, time, sequence, and treatments as the proposed action except the grazing intensity would be less for 29 of the 56 allotments where grazing is allowed. Thirty allotments would remain unchanged. Livestock numbers would be reduced 12 to 68 percent to implement this alternative.

Soils. Implementation of this alternative would eliminate most of the short term adverse impacts of increased erosion and decreased infiltration identified under the proposed action (table 3-2).

Short-term impacts would remain the same on custodial allotments and areas where grazing is proposed for elimination. In addition, short-term negative impacts would occur on the proposed seedings and on the riparian areas. Under this alternative, short-term positive impacts would occur on 504,269 acres of public land. Table 8-7 indicates the areas within each allotment that would have negative short-term erosion impacts as well as those areas where there would be no change in erosion. Long-term impacts to erosion for all allotments would remain the same as the proposed action.

Vegetation. While there is no definitive information to show how long the limitation of grazing would be required before studies show the

TABLE 8-7

Maximum Acreage of Reduced Soil Fertility - Long Term

Allotment	Pasture or Area Arrected	Public Land Acres
NO CHANGE		
Lamoreaux	Custodial	160
Mesa	Custodial	940
Red Butte	Custodial	894
Pace Knoll	Elimination	1,885
Pintura Seeding	Elimination	904
Sand Hills	Custodial	992
Sand Wash Reservoir	Custodial	640
Yellow Knolls		525
	SUB TOTAL	6,940
INCREASE		
Alger Hollow	Seeding	800
Black Canyon	All	600
Box Canyon	All	659
Bull Mountain	Riparian	804
Dalton Wash	All	855
Desert Inn	Riparian	36
Fault	Custodial	785
Fort Pierce	Riparian	108
Grafton	Riparian	18
Gunlock	Riparian	108
Herd House	Custodial	480
Hurricane	Custodial	160
Hurricane Fault	Riparian	18
Hurricane Mesa	Custodial	3,521
Jackson Wash	Seeding Pasture	4,730
Little Creek	Seeding	1,800

(continued)

TABLE 8-7 (continued)

Allotment	Pasture or Area Arrected	Public Land Acres
North Grafton	Custodial	500
Red Cliffs	Riparian	18
Scarecrow Peak	Riparian	18
Scarecrow Peak	Snow Holding Pasture	3,495
Twin Peaks	Seeding	480
Virgin	Riparian	108
White Dome	Custodial	984
	TOTAL	18,355

upward trend and improved condition, all allotments are estimated to reach this situation by the end of the third cycle.

The reduced utilization by livestock grazing on the vegetation would allow earlier plant recovery and attainment of the potential production.

Table 8-8 shows the difference in attainment time between this alternative and the proposed action. Those allotments identified in the proposed action as showing improvement but still unable to reach their potential within the time frame will reach the potential under this alternative. At year 24, the situation illustrated in table 8-9 could be expected.

Wildlife. Impacts of this alternative would be identical to those of the proposed action except in those 29 allotments where livestock numbers would be reduced from the proposed action. This reduction in livestock grazing use would leave more forage available for wildlife and improve the habitat cover for small mammals and birds in a shorter period of time than the proposed action.

TABLE 8-8

Comparison of Potential Attainment Between Proposed Action and Alternative 4

Allotment or AMP	Percent Reduction Needed To Implement Alternative 4	Time In Years for Attaining Potential Production: Alternative 4	Time In Years for Attaining Potential Production: Proposed Action
Alger Hollow	37	15	18
Apex Slope	68	12	18
Beaver Dam Slope	33	20	24
Big Mountain	33	20	24
Boomer Hill	54	16	24
Boot Spring	53	16	24
Bull Mountain	38	15	18
Central	40	10	12
Cougar Canyon	30	15	18
Curly Hollow	12	23	24
Dagget Flat	65	10	12
Desert Inn	38	10	12
Dome	37	15	18
Fort Pierce	35	10	12
Gooseberry	41	10	12
Grafton	36	20	24
Hurricane Fault	35	20	24
Jackson Wash	50	18	24
Little Creek	35	10	12
Red Cliffs	39	12	15
Sand Mountain	35	10	12
Scarecrow Peak	46	18	24
Short Creek	35	10	12
Smith Mesa	50	9	12
Toquerville	36	15	18

(continued)

TABLE 8-8 (concluded)

Allotment or AMP	Percent Reduction Needed To Implement Alternative 4	Time in Years for Attaining Potential Production: Alternative 4	Time in Years for Attaining Potential Production: Proposed Action
Trail	50	9	24
Twin Peaks	39	15	18
Veyo	39	20	24
Virgin	37	15	18

TABLE 8-9

Expected Situation in Year 24 Under Alternative 4

Livestock Forage Condition Acres		Trend	Livestock Forage Production	Possibility of Reaching Potential Livestock Production
509,873	Improving	Up	Increasing	Good
16,902	Declining	Down	Decreased	Poor
2,789	No change	Static	Available but not allocated	No potential identified

The short-term impacts to wildlife from grazing systems that increase utilization would be avoided with this alternative since no more than 50 percent of the current growth would be utilized by livestock. By the time the plans are fully implemented, there should be sufficient forage in each pasture to alleviate any possible competition with wildlife. The desert tortoise habitat would be beneficially impacted.

Water Resources. Impacts to water quality would be similar to those that would occur under the proposed action. However, with limited grazing during the first cycle, the magnitude of impacts resulting from sediment discharge, concentration of livestock in stream bottom areas, and overland flow caused by the removal of vegetation would be reduced. The degree to which these reductions would affect overall water quality is not known. It is possible that any short-term benefits to water quality which are gained during the first cycle could be offset by later increasing stocking rates as vegetative resources improve.

Fisheries. This alternative could result in less intensive utilization of riparian vegetation and trampling of stream banks. The degree to which utilization and trampling would differ from the proposed action cannot be quantified; nor can the anticipated impacts. Assuming these factors would be lessened over the short term of the first grazing cycle, the benefits would be negated with an increased grazing intensity during subsequent grazing cycles. Impacts to riparian habitat, fish, and water quality would then be similar to those analyzed for the proposed action.

Cultural Resources. This alternative would produce the same impacts as the proposed action, except sheet erosion would slightly decrease, reducing the threat of some sites being exposed to possible damage.

Recreation. Impacts would be of the same nature as those discussed in the analysis of the proposed action. However, this alternative appears to be slightly better from a recreational standpoint because the expected improvement would occur sooner.

Visual Resources. Impacts on the area's visual resources would be similar to those discussed under the proposed action. The anticipated landscape changes may occur faster under this alternative.

Wilderness. Impacts to wilderness values would be similar to the long-term impacts in the proposed action. Favorable impacts may occur earlier in time due to favorable impacts to ecological values.

Livestock. This alternative would require an average 39-percent reduction in stocking rates. In the long term, impacts would be the same as

the proposed action. Table 8-8 shows the percent reduction needed to implement this alternative for 29 allotments. Because most of these reductions are quite large, many of the permittees could very likely terminate their livestock operations.

Socioeconomic. Table 8-10 summarizes the short-term impacts from this alternative. Tables 8-11, 8-12, and 8-13 depict the impacts to the typical operator by scale of operation. For an explanation of the importance of public range land to permittees by scale of operation, refer to Socioeconomic section of Chapter 2.

TABLE 8-10

Alternative 4: Short-Term Impact Summary

		Operator Scale		
	Total	Small	Medium	Large
Net income				
Existing net income/AUM	$ NA	$ 1.33	$ 2.11	$ 2.77
Existing net income total	$ 39,831	$ 6,395.00	$ 20,675.00	$12,761.00
Alternative 4 net income/AUM	NA	$ (0.64)	$ 1.12	$ 3.09
Alternative 4 net income/total	$ 26,269	$ 0	$ 9,274.00	$16,995.00
Net income total	$(13,562)	$(6,395.00)	$ (1,140.00)	$(4,234.00)
Capital valuea				
Existing capital value/AUM	NA	$ 0.66	$ 9.60	$ 8.46
Existing capital value total	$255,326	$56,723.00	$120,136.00	$78,467.00
Alternative 4 capital value total	$160,381	$34,363.00	$ 79,488.00	$46,530.00
Capital value	$(94,945)	$(22,360.00)	$(40,648.00)	$(31,937.00)

Note: Long term would be similar to the proposed action

[a]Capital values are not expected to change per AUM.

NA = Not applicable

TABLE 8-11

Alternative 4: Short-Term Annual Income and Expenses for the Average Small Operator

	Existing (dollars)	Proposed Average[a] (dollars)	Percent
INCOME			
Calf sales	$2,226.00	$1,781.00	
Cull sales	171.00	137.00	
GROSS INCOME	$2,397.00	$1,918.00	
Net change	....	(479.00)	20
EXPENSES			
Feed	$ 48.00	$ 38.00[b]	
Grazing fees	68.00	54.00[b]	
Veterinary	61.00	49.00[b]	
Variable expenses	$ 177.00	$ 141.00[b]	
Net change	....	(36.00)	20
Fixed expenses	$1,901.00	$1,901.00	
TOTAL EXPENSES	$2,078.00	$2,042.00	
Net change	....	(36)	2
Average cost per cow	$ 103.90	$ 127.50	
Average cost per AUM	$ 8.66	$ 10.63	
NET INCOME			
Gross income	$2,397.00	$1,918.00	
Total expenses	2,078.00	2,041.00	
NET INCOME	$ 319.00	$ (123.00)	
Net change	....	(442.00)	139
Net income per cow	$ 15.95	$ (7.69)	
Net income per AUM	$ 1.33	$ (0.64)	
Average number of cows	20	16	

[a]Based on total change (20 percent reduction) in small operator 1976 licensed use.

[b]Assume would change proportionate to change in AUMs.

TABLE 8-12

Alternative 4: Short-Term Annual Income and Expenses for the Average Medium Operator

	Existing 3-Year Average (dollars)	Proposed Average[a] (dollars)	Percent
INCOME			
Calf and yearling sales	$11,470.00	$ 9,520.00	
Cull sales	1,890.00	1,569.00	
Pasture rent	1,392.00	1,629.00	
GROSS INCOME	$14,752.00	$12,718.00	
Net change	....	(2,034.00)	14
EXPENSES			
Feed	$ 1,992.00	$ 1,653.00[b]	
Grazing fees	1,116.00	926.00[b]	
Veterinary	47.00	39.00[b]	
Variable expenses	$ 3,855.00	$ 2,618.00[b]	
Net change	....	(537.00	17
Total fixed expenses	$ 8,935.00	$ 8,935.00	
TOTAL EXPENSES	$12,090.00	$11,553.00	
Net change	....	(537.00)	4
Average cost per cow	$ 115.14	$ 132.79	
Average cost per AUM	$ 9.60	$ 11.07	
NET INCOME			
Gross Income	$14,752.00	$12,718.00	
Total Expenses	12,090.00	11,553.00	
NET INCOME	$ 2,662.00	$ 1,165.00	
Net change	....	(1,497.00)	56
Net income per cow	$ 25.35	$ 13.39	
Net income per AUM	$ 2.11	$ 1.12	
Average number of cows	105	87	

[a]Based on total change (17 percent reduction) of medium operator 1976 licensed use.

[b]Assume would decrease proportionate to decrease in AUMs.

TABLE 8-13

Alternative 4: Short-Term Annual Income and Expenses for the Average Large Operator

	Existing 3-Year Average (dollars)	Proposed Average[a] (dollars)	Percent
INCOME			
Livestock production and and cull sales	$24,944.00	$27,937.00	
Return to operator	3,258.00	3,649.00	
Other	7,195.00	7,195.00	
GROSS INCOME	$35,397.00	$38,781.00	
Net change	....	+3,384.00	10
EXPENSES			
Feed	$ 2,892.00	$ 3,239.00[b]	
Grazing fees	2,951.00	3,305.00[b]	
Veterinary	195.00	218.00[b]	
Trucking	832.00	932.00[b]	
Variable expense	$6,870.00	$7,694.00[b]	
Net change	....	+824.00	12
Fixed expenses	$19,118.00	$19,118.00	
TOTAL EXPENSE	$25,988.00	$26,812.00	
Net change	....	+824.00	3
COSTS			
Total expenses	$25,988.00	$26,812.00	
Return to operator	3,258.00	3,649.00	
TOTAL COST	$29,246.00	$30,461.00	
Net change	....	+1,215.00	4
Cost per cow	$ 101.55	$ 94.31	
Cost per AUM	$ 8.46	$ 7.86	
NET INCOME			
Gross income	$35,397.00	38,781.00	
Total expense	25,988.00	26,812.00	
NET INCOME	$ 9,409.00	$11,969.00	
Net change	....	+2,560.00	27
Net income per cow	$ 32.87	$ 37.06	
Net income per AUM	$ 2.77	$ 3.09	
Average number of cows	288	323	

[a]Based on total change (12 percent increase) of large operator 1976 licensed use.

[b]Assume will change proportionate to change in AUMs.

The small operations would receive negative annual net incomes; the medium scale would also decline (17 percent). Because the large operators stock significantly below the BPQ, the plan could increase annual net incomes to $3.09 per AUM, a 27-percent increase.

The long-term impacts would be similar to those in the proposed action.

ALTERNATIVE 5 - DELAYED IMPLEMENTATION OF THE PROPOSED ACTION

This alternative would be similar to the proposed action in respect to the types of Allotment Management Plans proposed. The difference between this alternative and the proposed action is the time schedule for implementing the program. The purpose of this alternative would basically be to achieve the same goals as the proposal but consider time as a variable. It would be more flexible to manpower and funding constraints than would the proposed action. The proposed action would be implemented over a 5-year period, whereas this alternative would be implemented over 42 years. The Cedar City District has implemented three Allotment Management Plans in Washington County, Utah since 1968, an average of one AMP every 3 years. At this rate, it would take 126 years to implement the 42 proposed AMPs. However, with increased funding for the range development program, it is anticipated that this alternative could be implemented within the proposed 42 years.

In the interim, the existing BLM range management program and policies would be continued. Stocking rates on all allotments would be reduced to the estimated carrying capacity determined from the latest forage inventory.

The Bureau would continue with its present program of implementing and maintaining AMPs, constructing range developments, and grazing use supervision.

Description. With this alternative, term permits would be issued for periods of up to 10 years. The permit would specify the class and number of livestock and the season when grazing would be permitted.

Assumptions made in developing this alternative include the following:

1. All regular nonuse would be continued

2. Grazing use levels for custodial management units as identified in the proposed action would not change with this alternative. Implementation would begin at year 1

3. All eliminations would be effected at year 1

4. Allotments with existing AMPs would achieve potential forage availability levels

5. All allotments would be reduced to the survey carrying capacity before implementation

6. Grazing would not be allowed on unallotted areas

7. Range users would be required to continue maintenance of certain existing range developments on public land in a serviceable condition. The permittees would be allowed to construct new range developments on public land with prior approval from BLM

Soils. Delayed implementation would have the same long-term impact to the soil resource as the proposed action. It would, however, require a much longer time to accomplish (24 years under the proposed action vs. 66 years under this alternative).

There would be an immediate improvement in erosion and infiltration rates on all allotments because stocking rates would be in line with carrying capcities.

Soil compaction would be reduced and a slight increase in litter accumulation could be expected.

Because of the extended time frame, soil loss through erosion would continue but at a slightly reduced rate until AMPs would be implemented. This could affect the production potential of soils.

Once all AMPs have been implemented, erosion rates would be similar to the proposed action.

This alternative would not change the impacts on areas proposed for custodial management or elimination of grazing under the proposed action.

Vegetation. The anticipated impacts on vegetation from implementation of this alternative would be basically the same as those from the proposed action except attainment of the objectives would require 66 years compared to 24 years for the proposed action. At year 24 (the date all allotment objectives would be reached under the proposed action), only four allotments would have reached their objectives, with an additional 18 allotments showing improving conditions (table 8-14). The AMPs for

TABLE 8-14

Expected Situation in Year 24
Under Alternative 5

Livestock Forage Condition Acres		Trend	Livestock Forage Production	Possibility of Reaching Potential Livestock Production
65,138	Improving	Up	Increasing	Good
2,789	Static	Static	No change	....
461,637	Declining	Down	Decreasing	Poor

two allotments would have been implemented, but would not show improvement.

In addition, the assumption was made that up until implementation, all allotments with spring grazing (even at reduced livestock numbers) would have certain areas that would continue to decline. However, the rate may be slower than at present. All allotments would show some improvement on some areas. However, there would still be problems with distribution and utilization and certain areas would continue to decline. Because most allotments are presently in poor condition, a continued decline would not change their condition at the time of AMP implementation. Therefore, no adjustment in time of attaining objectives was made. For example, Land Hill was expected to obtain its objective in 24 years under the proposed action and also in 24 years under this alternative, even though it would not be implemented for 42 years. The allotments without spring use were assumed to remain unchanged until implementation.

Wildlife. Wildlife would benefit over the present situation by the reduction in livestock numbers, although the decline in carrying capacity for deer in certain allotments (table 3-13) would occur faster than

in the proposed action because of the lack of sufficient rest for browse. Habitat for small mammals and birds would decline in those allotments with spring grazing due to the decrease of cover and perennial grasses. Quail habitat would also decline in those same allotments because of decreased cover, poor range condition, and reduced production. Loss of riparian habitat for wildlife in certain allotments (table 3-13) would occur faster than in the proposed long term. Impacts would be similar to those of the proposed action after implementation of the AMPs. The desert tortoise habitat would continue to decline as in the proposed action.

Water Resources. This alternative would allow maintenance of current levels, or a gradual increase in sediment levels, due to the overall downward trend in range condition and riparian areas until time of full implementation of management plan. A gradual increase in silt and dissolved solids would threaten the existence of fishes during low flows before implementation of management plan.

Fisheries. The present grazing pattern along the fisheries' habitat would be continued in varying degrees over a 42-month period of time, depending upon the time frame of AMP implementation in areas where fisheries' habitat occur. During this delay period, impacts would be similar to those discussed in the No Action Alternative. Upon implementation, impacts would be the same as the proposed action.

Another important factor associated with a delay would be failure to implement a monitoring program and mitigating measures discussed in Chapter 4.

Cultural Resources. The damage to any archaeological sites being trampled by livestock would continue until the AMPs were implemented. Then impacts would be the same as under the proposed action.

Recreation. Viewing opportunities would be enhanced, although less than the proposed action. Impacts on recreation would be the same once the AMPs were implemented.

Visual Resources. The major scenic change, primarily related to vegetation change over time, would take a longer time to occur than with the

proposed action. In the proposed chaining areas, VRM objectives would be met by following standard design stipulations. Impacts of other improvement projects would be the same as the proposed action.

Wilderness. Impacts to wilderness values would be similar to the proposed action but improvement would take a much longer time.

Livestock. The initial short-term impacts would be the same as the No Action Alternative (Alternative 2). With the increase of forage through AMP implementation, the short-term impacts would approach the proposed action.

In the long term, the increase in forage would be achieved over a longer period.

Socioeconomics. The impacts of this alternative would be similar to the proposed action with an extended time schedule.

The short-term impacts would be somewhat similar to the proposed action, with the exception of those allotments with improvements proposed that would increase the carrying capacity (seedings, water developments, etc.). In the long term, any increase in AUMs would be allocated at a later period.

Economically, the net incomes would be somewhat lower than anticipated in the proposed action in the short term. Capital value impacts would be similar to the proposed action. In the long term, net incomes would be significantly slower in their increase as would the capital values. Those individuals with the most marginal or negative returns would have less potential for participation in the activity.

Social impacts would be similar to the proposed action.

ALTERNATIVE 6 - INCREASED FORAGE PRODUCTION THROUGH VEGETATIVE MANIPULATION

Portions of four allotments have been identified as having the potential to increase their forage capacity rapidly by chaining and seeding.

This alternative is similar in all other respects to the proposed action and would be implemented in the same manner. The only difference is that this alternative calls for completing additional vegetative manipulation practices to increase forage production. This would be a high intensity grazing management alternative aimed at achieving the specific goals of the proposal by reducing long-term negative impacts associated with these four allotments.

The following allotments contain 1,660 acres of public land that have the potential to produce an additional 208 AUMs of forage by mechanical vegetative conversion. The increased production would be allocated to both livestock and wildlife and would be in proportion to the actual need and management goals for these areas.

Smith Mesa	560 acres @ 8 acres/AUM = 70 AUMs
Coal Pits	150 acres @ 8 acres/AUM = 19 AUMs
Mesa	800 acres @ 8 acres/AUM = 100 AUMs
Alger Hollow (Wide Canyon)	150 acres @ 8 acres/AUM = 19 AUMs

Soils. If this alternative is implemented, only the four allotments proposed for mechanical treatments would be affected. Table 8-15 summarizes the expected changes.

A short-term increase in soil erosion could be expected immediately following mechanical treatment on 1,660 acres. Short-term increases in erosion under this alternative would include those listed in table 3-2 (182,662 acres) plus an additional 1,660 acres for a total of 184,322 acres.

The remaining 345,242 acres would have short-term impacts similar to the proposed action. Treatment areas on two allotments, Mesa and

TABLE 8-15

Impact Summary

Allotment	Pasture	Erosion Short Term	Erosion Long Term	Infiltration Short Term	Infiltration Long Term
Alger Hollow	Wide Canyon	Negative	Positive	Positive	Positive
Coalpits	Coalpits	Negative	Positive	Positive	Positive
Mesa	All	Negative	Positive	Positive	Positive
Smith Mesa	All	Negative	Positive	Positive	Positive

Coalpits, would be particularly susceptible to short-term increased erosion because soils on these allotments have a high erosion potential.

Long-term impacts for all allotments would be the same as the proposed action.

Vegetation. Under this alternative, the allotments would be managed the same and have the same impacts as under the proposed action, except for the following four allotments: Smith Mesa, Coal Pits, Mesa, and Alger Hollow.

Smith Mesa (1,940 acres Public Land). The total acreage would improve; perennial grasses would increase in vigor and number. Forbs and annuals would decrease. There would be a short-term negative impact from the proposed chaining on the 560 acres.

Coal Pits (3,310 acres Public Land). The total acreage would improve with increased perennial grasses and decreased forbs and annuals. There would be a short-term negative impact on the 150 acres treated. Long-term impact would be positive.

Mesa (1,640 acres Public Land). The total acreage would improve in vegetative condition. Perennial grasses would increase. There would be a short-term negative impact on vegetation on the 800 acres treated.

Alger Hollow (23,780 acres Public Land). The total acreage would improve. Perennial grasses would increase. There would be a short-term negative vegetation impact for the 150 acres treated.

Impacts on these allotments are detailed in table 8-16, and the expected situation at year 24 is shown in table 8-17. On the four allotments, forage production would increase 20 percent from 1,014 AUMs to 1,222 AUMs.

Wildlife. This alternative would be the most beneficial to deer, compared to the present situation or the proposed action for these allotments. All the allotments concerned are important deer winter range. The carrying capacity for deer would increase because of the increase of browse in the seedings on Smith Mesa, Mesa, and Coal Pits Allotments. Sufficient cover would be available for the deer, and the seedings would probably alleviate some pressure on the private fields on Smith Mesa and Mesa Allotments. This alternative would also benefit other wildlife because of the increased production and upward range trend on these allotments. Overall competition for available forage would be reduced. The desert tortoise habitat would continue to decline as in the proposed action.

Water Resources and Fisheries. Short-term increases in sediment could be expected from chained areas, but once vegetative cover was established, this impact would be eliminated. All other impacts would be similar to the proposed action.

Cultural Resources. This alternative would produce the same impacts as the proposed action, except in the treatment areas. Standard guidelines would be followed during treatment to minimize impacts to archaeological sites.

Recreation. Impacts to recreational resources would be similar to those discussed under the proposed action except for the project areas. In the long term some slight improvement in soil and watershed conditions on the treated sites might benefit recreational resources.

There would be more firewood available to the public in the additional chained areas.

TABLE 8-16

Alternative 6: Impacts on Vegetation

Grazing System or Allotment	Area Affected	Average Present Situation: Desirable Plant Vigor[a]	Average Present Situation: Apparent Trend	Season of Use	Percent Current Growth Used (Palatable Species)	Resulting Impacts	Length of Impact	Livestock Forage Condition	Apparent Trend	Projected Change in Livestock Forage Production (AUMs)	Percent of Potential in 24 years	Impact Summary
Smith Mesa	All	Poor	Static	Fall/ winter	50	Cool season grass, warm season grass, woody plants, litter accumulation, and riparian vegetation - increased. Forbs and annual grass - reduced. Plant composition change - perennial grass is favored.	Short term, long term	Improved	Up	Increased from 36 to 106	100	Positive
Coalpits	All	Fair	Static	Fall	50	Cool season grass, warm season grass, woody plants litter accumulation, and riparian vegetation - increased. Forbs and annual grass - reduced. Plant composition change - perennial grass is favored.	Short term, long term	Improved	Up	Increased from 82 to 101	100	Positive
Mesa	All	Poor	Static	Winter	50	Cool season grass, warm season grass, woody plants, litter accumulation, and riparian vegetation - increased. Forbs and annual grass - reduced. Plant composition change - perennial grass is favored.	Short term, long term	Improved	Up	Increased from 24 to 124	100	Positive
Alger Hollow	All	Poor	Down	Fall/ winter/ spring	50	Cool season grass, warm season grass, and litter accumulation - increased. Forbs and annual grass - reduced. Woody plants - no change. Plant composition - perennial grass favored. Riparian vegetation - the preferred watering places will decline; lightly used areas will improve.	Short term, long term	Improved	Up	Increased from 872 to 891	100	Positive

[a]Desirable plant vigor generally applies to most of the allotment that is currently used by livestock although localized exceptions exist. This is a visual observation from one point in time. Vigor estimates were included because it influences the kind and degree of impact and also affects the possibility of reaching potential forage production.

NOTE: Comparison based on existing condition.

TABLE 8-17

Expected Situation in Year 24 Under Alternative 6

Livestock Forage Condition Acres		Trend	Livestock Forage Production	Possibility of Reaching Potential Livestock Production
476,809	Improving	Up	Increasing	Good
52,755	Declining	Down	Decreasing	Poor

Visual Resources. Landscape changes would be similar to those prescribed in the Future Environment Without Project section, with some exceptions. The additional chainings would result in more of the visual impacts as discussed under chainings in the proposed action. It would be difficult to meet the Visual Resource Management objectives on any of the additional proposed chainings, particularly on Smith Mesa, Mesa, and Coalpits Allotments, which would be very noticeable from well-traveled roads close to Zion National Park where visual sensitivity is high. There may be little overall change in the area's vegetative pattern outside of the chained areas. It is quite possible that soil and watershed deterioration, as they affect landscape characteristics (see Future Environment Without Project), would continue under this alternative.

Wilderness. None of the proposed chainings would be within the potential wilderness areas.

Livestock. With this plan, an additional 208 AUMs would be added to the proposed action. This could be an important increase to those permittees in the four affected allotments. Considering the total planning unit, this would be a minor increase over the proposed action.

Socioeconomic. This alternative to optimize forage production would be similar to the proposed action with the exception of the four allotments increasing their combined annual net income ($436.08) and capital value

$2,169 over the proposed action. However, this would not be a significant change in the planning unit's economy.

ALTERNATIVE 7 - REDUCTION OF IMPACTS ON SELECTED ALLOTMENTS

This alternative addresses specific problems and the purpose would be to reduce impacts on selected allotments. it would result in a more rapid resource recovery rate and would achieve the same basic goals as the proposal. From an analysis standpoint, it would be expected to produce the greatest benefits while reducing adverse impacts of grazing management throughout the Hot Desert area.

Aside from specific allotments addressed in this alternative, the proposed action would remain unchanged and would be implemented as indicated in Chapter 1.

This alternative was developed to avoid and/or reduce specific impacts of the proposed action on watershed condition, wildlife habitat, and vegetation while basically achieving the objectives of the proposed action. This alternative has three parts as described below:

1. The first part of this alternative would adjust livestock use on the allotments listed in table 8-18. It would be designed to restrict livestock use during the spring to minimize impacts on vegetation and reduce competition for browse between deer and livestock.

2. The second part of this alternative would redesign grazing systems on the following allotments to minimize negative impacts on vegetation caused by an overutilization of livestock forage:

a. The Apex Slope Allotment, as developed in the proposed action, prescribes grazing use in the winter to be nearly 3 times more than the proposed grazing capacity. The third portion of this alternative would redesign the proposed two-pasture rotation rest system (two during winter and two during spring) into a three-pasture delayed rotation system similar to that proposed on the Curly Hollow Allotment.

The proposed allotment would be divided as shown in figure 8-2. The proposed north pasture would be separated vertically by a continuation of the fence that separates the east and west pastures. The south pasture would remain unchanged from the proposal. This would result in larger west and east pastures than the proposal, with each pasture having an additional supply of AUMs as shown on figure 8-2.

TABLE 8-18

Proposed Livestock Use

Proposed Allotment	Proposed Action Season of Use	Season of Use - Alternative 7
Airport (custodial)	Spring every year	Rotate livestock grazing in the spring 1 year out of 3.
Black Canyon (custodial)	Spring every year	Allow livestock grazing in the spring 1 year out of 3, rotating with summer and fall use to avoid competition with deer during critical winter months.
Boomer Hill	Winter every other year	Reduce stocking rate to capacity of lowest pasture and rotate in winter 1 out of 2 years.
Box Canyon (custodial)	Spring every year	Rotate livestock grazing in the spring 1 year out of 3.
Coalpits (custodial)	Winter and late spring every year	Rotate livestock grazing 1 year out of 2 for winter and 1 year out of 3 for spring.
Dalton Wash (custodial)	Spring every year	Allow livestock grazing in the spring 1 year out of 3, rotating with summer and fall use to avoid competition with deer during the critical winter months.
Fault (custodial)	Spring every year	Rotate livestock grazing in the spring 1 year out of 3.
Gunlock	Winter use 2 years out of 3	Limit livestock use in winter to 1 year out of 3, allow a fall/winter/spring rotation.
Herd House (custodial)	Spring every year	Rotate livestock grazing in the spring of the year 1 year out of 3.
Hurricane (custodial)	Yearlong	Fall/winter or rest 1 year out of 3 years to minimize vegetation impact.

(continued)

TABLE 8-18 (continued)

Proposed Allotment	Proposed Action Season of Use	Season of Use - Alternative 7
Hurricane Mesa (custodial)	Yearlong	Allow livestock grazing in the spring 1 year out of 3, rotating with summer and fall use to avoid competition with deer during the winter months.
Land Hill	Winter use every year	Rotate livestock use to every other winter or summer/fall period to reduce competition for browse during critical winter months.
Lamoreaux (custodial)	Spring every year	Allow livestock grazing in the spring 1 year out of 3, rotating with summer and fall use to avoid competition with deer during the winter months.
Mesa (custodial)	5/1-10/15 every year	Summer/fall use to minimize vegetation impact (no spring use).
North Grafton (custodial)	Spring every year	Fall/winter or rest 1 year out of 3 years to minimize vegetation impact.
Red Butte (custodial)	5/1-10/31 every year	Summer/fall use to minimize vegetation impact (no spring use).
Rock Springs (custodial)	Summer every year	Rotate livestock grazing in the spring 1 year out of 3.
Sand Hills (custodial)	Spring every year	Rotate livestock grazing in the spring 1 year out of 3.
Sand Wash Reservoir (custodial)	Spring every year	Rotate livestock grazing in the spring 1 year out of 3.
Santa Clara Creek	Winter every year	Allow livestock grazing in the spring 1 year out of 3, rotating with summer and fall use to minimize competition with deer during the critical winter months.

(continued)

TABLE 8-18 (concluded)

Proposed Allotment	Proposed Action Season of Use	Season of Use - Alternative 7
Smith Mesa	Yearlong every other year	Allow livestock grazing in the spring 1 year out of 3, rotating with summer and fall use to minimize competition with deer during the critical winter months.
White Dome (custodial)	Spring every other year	Rotate livestock grazing in the spring 1 year out of 3.
Yellow Knolls (custodial)	Spring every year	Rotate livestock grazing in the spring 1 year out of 3.

The resulting three-pasture allotment would be grazed as follows:

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
A.	Rest					Rest to establish seedlings						
B.	Rest						Rest for vigor and litter					
C.	Rest								Rest seed production			

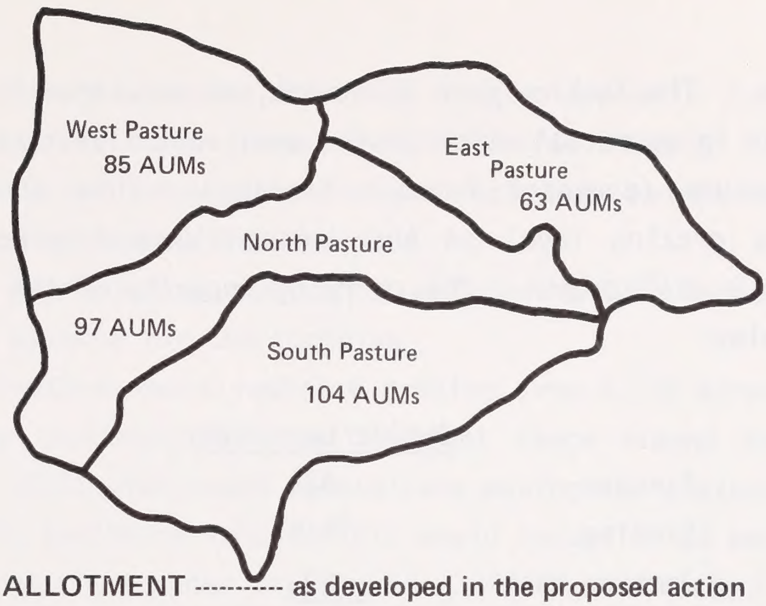
Treatment A prescribes use from December 20 through January 20.

Treatment B prescribes use from January 21 through February 20.

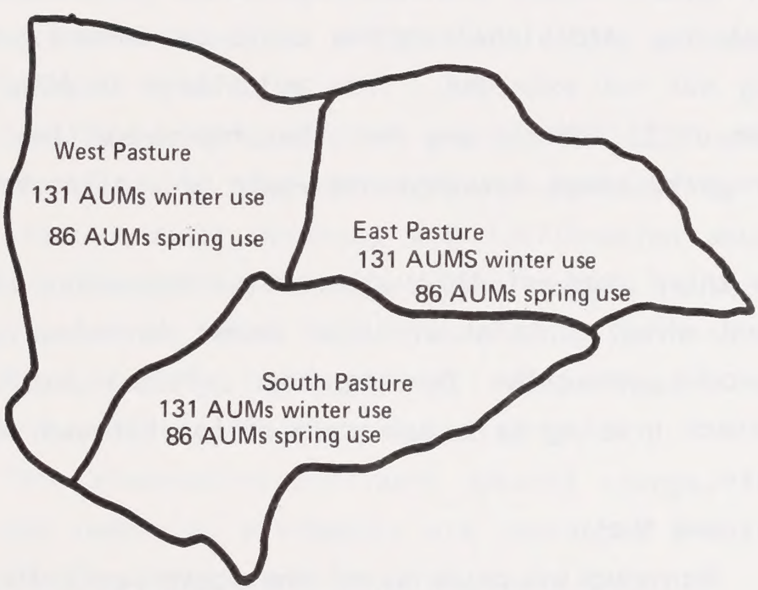
Treatment C prescribes use from April 1 through April 30.

The grazing sequence for 3 years would be as described below. Beginning the fourth year, the schedule would be repeated.

Pasture	First Year	Second Year	Third Year
West	A	B	C
East	B	C	A
South	C	A	B



APEX SLOPE ALLOTMENT ---------- as developed in the proposed action



APEX SLOPE ALLOTMENT ----- as redesigned in Alternative 7

Figure 8-2
APEX SLOPE ALLOTMENT

b. The Jackson Wash Allotment, as developed in the proposal, would result in overutilization of the available livestock forage in the seeding pasture (proposed Pahcoon Seeding). This alternative would realign the grazing level on the Jackson Wash Allotment to achieve proper forage utilization. The carrying capacity of the three pastures is shown below:

	Public Land AUMs
Pahcoon	471
Seeding	[a]455
Jackson Wash	503
	1,429

[a]Includes proposed 360 AUMs resulting from proposed Pahcoon Seeding.

This alternative would prescribe the grazing use in the seeding pasture not to exceed 455 AUMs and the allotment would be stocked on that basis. However, when the grazing system prescribes use in the other two pastures, additional cattle could be turned out as long as their capacity was not exceeded. This adjustment in AUMs would result in a reduction of 21 AUMs in use over the proposed action. The grazing system and proposed range developments would be similar to the proposed action.

3. The third part of this alternative addresses the Beaver Dam Slope Allotment which contains critical desert tortoise habitat. This alternative would prescribe fencing the critical habitat areas to exclude livestock grazing to reduce competition between cattle and the desert tortoise.

It is assumed that:

a. Reproduction capacity of the tortoise is directly related to the available succulent vegetation in the spring

b. The desert tortoise population is declining

c. The area is presently incapable of supplying sufficient succulent plants for the tortoise during the criticl reproductive season every year

d. Tortoises establish home ranges and will not move into ungrazed pastures or other areas when their food supply has been exhausted. Females and young have the smallest home ranges and are most severly impacted by competition for food

e. By isolating the tortoise from the livestock, sufficient forage will be assured for the tortoise

This alternative would restrict grazing from 5,120 acres of critical habitat by constructing a cattle-tight fence around the critical tortoise area. This plan would necessitate moving one pasture fence and constructing the exclosure fence. This would result in 13 more miles of fence than is required under the proposed action. Livestock use would be reduced by an estimated 200 AUMs. All other factors would remain the same as the proposed action.

The new AUM capacities, by pasture, would be as follows: Indian Springs - 743 AUMs; Beaver Dam - 743 AUMs; and Castle Cliffs - 799 AUMs.

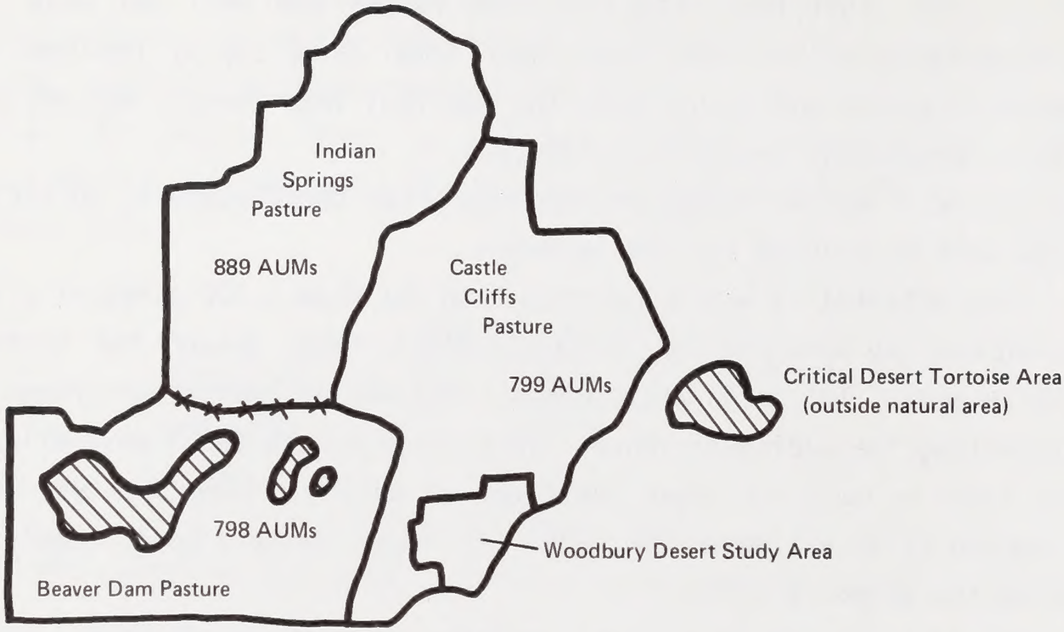
Figure 8-3 indicates how the allotment would be redesigned.

Soils. Implementation of this alternative would change the short and long-term impacts to erosion and infiltration on the pastures and allotments listed in table 8-19.

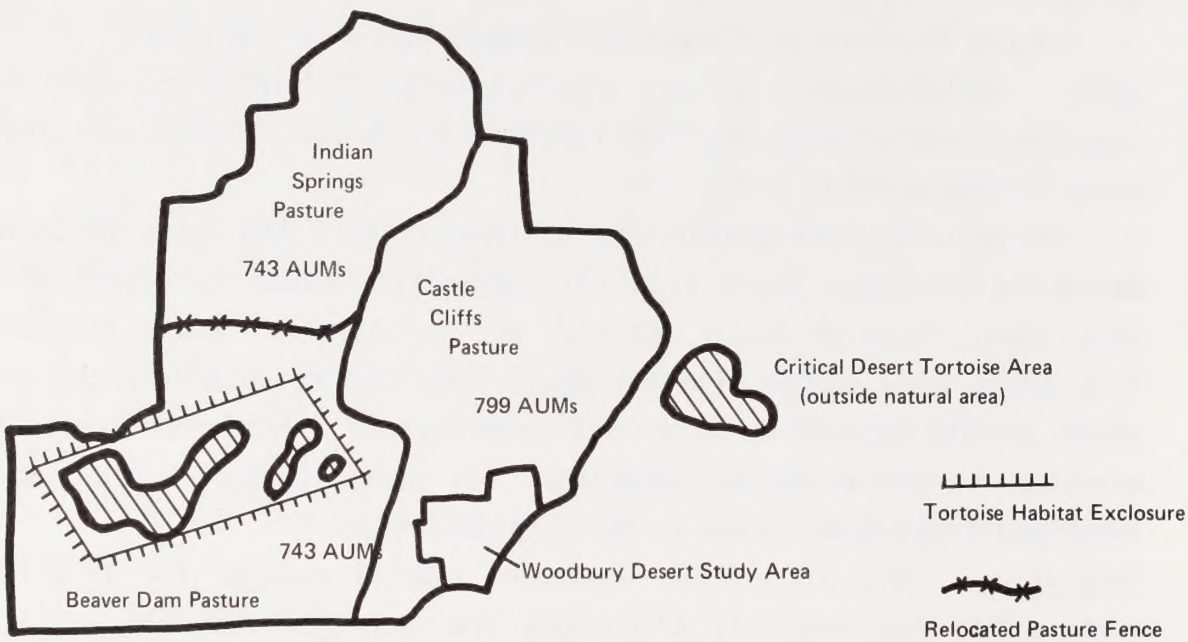
In addition, the elimination of grazing on 5,120 acres in Beaver Dam Slope Allotment would stop all compaction caused by livestock on this area. Erosion would decrease and infiltration would increase. This would be a change from the short-term impacts caused by the proposed grazing system in which both erosion and infiltration would be expected to be adversely impacted. All other impacts would remain unchanged from those listed in the proposed action.

Vegetation. This alternative considers special changes for 32 allotments while the remaining allotments are unchanged from the proposed action. The detailed impacts are shown in table 8-20.

Twenty-two allotments would involve season-of-use changes to eliminate continual grazing during the growing season and reduce competition for browse. All would show a definite improvement in plant vigor and in establishment of new perennial plants, especially cool season



BEAVER DAM SLOPE ALLOTMENT -- as developed by the proposed action



BEAVER DAM SLOPE ALLOTMENT -- as redesigned in Alternative 7

Figure 8-3
BEAVER DAM SLOPE ALLOTMENT

TABLE 8-19

Alternative 7: Analysis of Impacts to Soils

Allotment	Public Acres Affected	Cause	Percent[a]	Length of Impact	Impact	Impact Summary Short Term	Impact Summary Long Term
PART 1. ADJUSTED LIVESTOCK USE							
Typical allotment in this group	All	Ground cover would increase Intensity of use would decrease Soil compaction would decrease	...	Long term Short term	Erosion would decrease Infiltration would increase Soil fertility would improve	Positive	Positive
Airport	147	Same as typical	0	Same as typical	Same as typical	Same as typical	
Black Canyon	600	Same as typical	56	Same as typical	Same as typical	Same as typical	
Boomer Hill	4,327	Same as typical	18	Same as typical	Same as typical	Same as typical	
Box Canyon	659	Same as typical	82	Same as typical	Same as typical	Same as typical	
Coalpits (custodial)	1,135	Same as typical	40	Same as typical	Same as typical	Same as typical	
Dalton Wash	855	Same as typical	61	Same as typical	Same as typical	Same as typical	
Fault	785	Same as typical	41	Same as typical	Same as typical	Same as typical	
Gunlock	6,226	Same as typical	0	Same as typical	Same as typical	Same as typical	
Herd House (custodial)	480	Same as typical	0	Same as typical	Same as typical	Same as typical	
Hurricane (custodial)	160	Same as typical	25	Same as typical	Same as typical	Same as typical	
Hurricane Mesa (custodial)	3,521	Same as typical	94	Same as typical	Same as typical	Same as typical	
Land Hill	1,030	Same as typical	100	Same as typical	Same as typical	Same as typical	
Lamoreaux	160	Same as typical	50	Same as typical	Same as typical	Same as typical	

[a]Percent of area having high potential for erosion.

(continued)

TABLE 8-19 (continued)

Allotment	Public Acres Affected	Cause	Percent[a]	Length of Impact	Impact	Impact Summary Short Term	Impact Summary Long Term
Mesa (custodial)	940	Same as typical	100	Same as typical	Same as typical	Same as typical	
North Grafton	500	Same as typical	100	Same as typical	Same as typical	Same as typical	
Red Butte	894	Same as typical	57	Same as typical	Same as typical	Same as typical	
Rock Spring	820	Same as typical	75	Same as typical	Same as typical	Same as typical	
Sand Hills	992	Same as typical	100	Same as typical	Same as typical	Same as typical	
Sand Wash Reservoir	640	Same as typical	0	Same as typical	Same as typical	Same as typical	
Santa Clara Creek	3,038	Same as typical	100	Same as typical	Same as typical	Same as typical	
Smith Mesa	1,940	Same as typical	21	Same as typical	Same as typical	Same as typical	
White Dome (custodial)	984	Same as typical	74	Same as typical	Same as typical	Same as typical	
Yellow Knolls	525	Same as typical	0	Same as typical	Same as typical	Same as typical	

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PART 2. REDESIGNED GRAZING SYSTEMS

Allotment	Public Acres Affected	Cause	Percent[a]	Length of Impact	Impact	Impact Summary Short Term	Impact Summary Long Term
Typical allotment in this group	All	Ground cover would increase Intensity of use would decrease Soil compaction would decrease	...	Long term Short term	Erosion would decrease Infiltration would increase Soil fertility would improve	Positive	Positive
Apex Slope	5,879	Same as typical	20	Same as typical	Same as typical	Same as typical	
Jackson Wash (seeding pasture)	4,730	Same as typical	63	Same as typical	Same as typical	Same as typical	

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[a]Percent of area having high potential for erosion.

(continued)

TABLE 8-19 (concluded)

Allotment	Public Acres Affected	Cause	Percent[a]	Length of Impact	Impact	Impact Summary Short Term	Impact Summary Long Term
PART 3. EXCLUSION OF LIVESTOCK GRAZING							
Beaver Dam Slope	5,120	Ground cover would increase Soil compaction would decrease	...	Long term Short term	Erosion would decrease Infiltration would increase Soil fertility would improve slightly	Positive	Positive

[a]Percent of area having high potential for erosion.

TABLE 8-20

Alternative 7: Impacts on Vegetation

Grazing System or Allotment	Area Affected	Average Present Situation: Desirable Plant Vigor[a]	Average Present Situation: Apparent Trend	Season of Use	Percent Current Growth Used (Palatable Species)	Resulting Impacts	Length of Impact	Livestock Forage Condition	Apparent Trend	Projected Change in Livestock Forage Production (AUMs)	Percent of Potential in 24 years	Impact Summary
PART 1. ADJUSTED SEASON OF USE												
Typical allotment in this group	All	Poor	Static	Fall/ winter/ spring rotation	50	Cool season grass - gain vigor; produce seed; establish young plants. Warm season grass - same as cool season except would have opportunity for some growth after grazing that cool season would not. Forbs and annuals - natural competition would reduce most annuals in favor of perennials; annual forbs would decrease but perennial forbs may increase. Woody plants would improve. Plant composition change - favors increase of warm season grass, then cool season grass. Litter accumulation - increased.	Long term	Improved	Up	Increased	100	Positive
Airport	147	Same as typical		Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Maintained at 7	100	Positive
Box Canyon	659	Same as typical		Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Maintained at 48	100	Positive
Fault	785	Same as typical		Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Maintained at 37	100	Positive
Gunlock	622	Same as typical		Same as typical	Same as typical	Same as typical; browse would be favored.	Same as typical	Same as typical	Same as typical	Increased from 240 to 351	100	Positive
Herd House (custodial)	480	Same as typical		Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Maintained at 33	100	Positive

[a]Desirable plant vigor generally applies to most of the allotment that is currently used by livestock although localized exceptions exist. This is a visual observation from one point in time. Vigor estimates were included because it influences the kind and degree of impact and also affects the possibility of reaching potential forage production.

NOTE: Comparison based on existing condition.

(continued)

TABLE 8-20 (continued)

Grazing System or Allotment	Area Affected	Average Present Situation: Desirable Plant Vigor[a]	Average Present Situation: Apparent Trend	Season of Use	Percent Current Growth Used (Palatable Species)	Resulting Impacts	Length of Impact	Livestock Forage Condition	Apparent Trend	Projected Change in Livestock Forage Production (AUMs)	Percent of Potential in 24 years	Impact Summary
Hurricane (custodial)	160	Same as typical		Same as typical	Same as tyical	Same as typical	Same as typical	Same as typical	Same as typical	Maintained at 12	100	Positive
North Grafton	500	Same as typical		Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Maintained at 12	100	Positive
Sand Wash Reservoir	640	Same as typical		Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Maintained at 13	100	Positive
White Dome	984	Same as typical		Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Maintained at 8	100	Positive
Yellow Knolls	525	Same as typical		Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Maintained at 16	100	Positive
Typical allotment in this group	All	Poor	Static	Spring/summer/fall with rotation	50	Cool and warm season grasses - improve, gain vigor and increased seeding establishment. Palatable woody plants - improve in vigor; favors seedling establishment. Reduced annuals and forbs. Overall litter accumulation - increased. Favors establishment of perennial grass and shrubs.	Long term	Improved	Up	.... Improved	... 100	.... Positive
Black Canyon	600	Same as typical		Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Maintained at 12	100	Positive
Dalton Wash	855	Same as typical		Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Maintained at 26	100	Positive
Hurricane Mesa (custodial)	3,521	Same as typical		Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Maintained at 49	100	Positive
Lamoreaux	160	Same as typical		Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Maintained at 11	100	Positive

[a]Desirable plant vigor generally applies to most of the allotment that is currently used by livestock although localized exceptions exist. This is a visual observation from one point in time. Vigor estimates were included because it influences the kind and degree of impact and also affects the possibility of reaching potential forage production.

NOTE: Comparison based on existing condition.

(continued)

TABLE 8-20 (continued)

Grazing System or Allotment	Area Affected	Average Present Situation: Desirable Plant Vigor[a]	Average Present Situation: Apparent Trend	Season of Use	Percent Current Growth Used (Palatable Species)	Resulting Impacts	Length of Impact	Livestock Forage Condition	Apparent Trend	Projected Change in Livestock Forage Production (AUMs)	Percent of Potential in 24 years	Impact Summary
Land Hill	1,030	Same as typical		Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Increased from 39 to 59	100	Positive
Rock Spring	820	Same as typical		Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Maintained at 12	100	Positive
Sand Hills	992	Same as typical		Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Maintained at 28	100	Positive
Santa Clara Creek	3,038	Same as typical		Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Increased from 69 to 93	100	Positive
Smith Mesa	1,940	Same as typical		Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Maintained at 36	100	Positive
Typical allotment in this group	All	Poor	Static	Summer/ fall	50	Cool season grass - increase in vigor and establishment. Warm season grass - decrease. Litter accumulation - improved. Annuals - no change. Palatable forbs may decrease. Woody plants - improved vigor and establishment. Favor cool season grass and woody shrub improvement; annuals and forbs - no overall change.	Long term	Improved	Up	Improved	100	Positive
Mesa (custodial)	940	Same as typical		Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Maintained at 17	100	Positive
Red Butte	894	Same as typical		Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Same as typical	Maintained at 12	100	Positive

[a]Desirable plant vigor generally applies to most of the allotment that is currently used by livestock although localized exceptions exist. This is a visual observation from one point in time. Vigor estimates were included because it influences the kind and degree of impact and also affects the possibility of reaching potential forage production.

NOTE: Comparison based on existing condition.

(continued)

TABLE 8-20 (continued)

Grazing System or Allotment	Area Affected	Average Present Situation: Desirable Plant Vigor[a]	Average Present Situation: Apparent Trend	Season of Use	Percent Current Growth Used (Palatable Species)	Resulting Impacts	Length of Impact	Livestock Forage Condition	Apparent Trend	Projected Change in Livestock Forage Production (AUMs)	Percent of Potential in 24 years	Impact Summary
Typical allotment in this group	All	Poor	Static	Winter rotation	50	Cool and warm season grasses - positive impact. Forbs and annual grass - no change. Woody plants - improved. Plant composition change - slight favor for increase in perennial grass; decrease in palatable browse. Litter accumulation - slight increase.	Long term	Improved	Up	Increased	100	Positive
Boomer Hill	4,327	Same as typical		Same as typical	Same as typical	Same as typical; faster improvement due to reduced use.	Same as typical	Same as typical	Same as typical	Increased from 138 to 196	100	Positive
Coalpits (custodial)	1,135	Same as typical		Same as typical	Same as typical	Same as typical	Same as typial	Same as typical	Same as typical	Maintained at 49	100	Positive

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PART 2. REDESIGNED GRAZING SYSTEMS

Grazing System or Allotment	Area Affected	Desirable Plant Vigor[a]	Apparent Trend	Season of Use	Percent Current Growth Used (Palatable Species)	Resulting Impacts	Length of Impact	Livestock Forage Condition	Apparent Trend	Projected Change in Livestock Forage Production (AUMs)	Percent of Potential in 24 years	Impact Summary
Apex Slope Accumulative treatments	5,879	Fair	Static	Winter/ spring	50	Cool season, warm season grass - increased. Forbs and annual grass - no change. Woody plants - increased. Plant composition change - favors increase in perennial grass, improvement in palatable browse although improvement in existing condition. Litter accumula- increased. Riparian vegetation - some areas would show improvement while the most preferred watering areas would decline in vigor and perennial vegetation.	Long term	Improved	Up	Increased to 403	100	Positive

[a]Desirable plant vigor generally applies to most of the allotment that is currently used by livestock although localized exceptions exist. This is a visual observation from one point in time. Vigor estimates were included because it influences the kind and degree of impact and also affects the possibility of reaching potential forage production.

NOTE: Comparison based on existing condition.

(continued)

TABLE 8-20 (concluded)

Grazing System or Allotment	Area Affected	Average Present Situation: Desirable Plant Vigor[a]	Average Present Situation: Apparent Trend	Season of Use	Percent Current Growth Used (Palatable Species)	Resulting Impacts	Length of Impact	Livestock Forage Condition	Apparent Trend	Projected Change in Livestock Forage Production (AUMs)	Percent of Potential in 24 years	Impact Summary
Jackson Wash (seeding pasture) Accumulative treatments	4,730	Poor	Static	Winter/ spring/ rest	50	Cool season grass, warm season grass - increased vigor, seed production and plant establishment. Forbs and annual grass - perennial forbs decreased vigor and seed production; annuals not affected. Woody plants - increased vigor, seed production and plant establishment. Plant composition change - favor increase in perennial grass, decrease in forbs. Palatable browse - improved. Litter accumulation - increase.	Long term	Improved	Up	Increased to 483	100	Positive

***

PART 3. EXCLUSION OF LIVESTOCK GRAZING

Grazing System or Allotment	Area Affected	Desirable Plant Vigor[a]	Apparent Trend	Season of Use	Percent Current Growth Used (Palatable Species)	Resulting Impacts	Length of Impact	Livestock Forage Condition	Apparent Trend	Projected Change in Livestock Forage Production (AUMs)	Percent of Potential in 24 years	Impact Summary
Beaver Dam Slope (Tortoise Exclosure)	5,120 acres	Poor	Down	No season; no use by livestock	...	Cool season, warm season grass - increased. Forbs and annual grass - reduced Woody plants - increased. Plant composition change - natural succession favors perennial grass and browse. Litter accumulation, riparian vegetation - improved.	Short term, Long term	Improved	Up	Increased to 270	100	Positive

***

[a]Desirable plant vigor generally applies to most of the allotment that is currently used by livestock although localized exceptions exist. This is a visual observation from one point in time. Vigor estimates were included because it influences the kind and degree of impact and also affects the possibility of reaching potential forage production.

NOTE: Comparison based on existing condition.

grasses. Litter accumulation would improve. Browse species would improve in vigor. Two allotments would involve changing the grazing system.

With implementation of this alternative, Apex Slope Allotment would have three pastures under a deferred rotation system. Grazing intensity would be determined by the capacity of the lowest producing pasture. This would result in improved vegetative cover, slightly increased litter, increase in perennial grass, and improvement in vigor of palatable browse.

The proposed seeding on the Jackson Wash Allotment would be utilized at a degree that would favor its success. Introduced cool season grasses would be expected to improve in vigor and maintain themselves. Vigor of palatable browse species would improve. Grazing at the capacity of the seeding would encourage litter accumulation.

Beaver Dam Slope Allotment would remain basically the same as under the proposed action except for 5,120 acres being retired from domestic livestock grazing. This small area would improve with the native dominant species increasing. Thirteen miles of fence would be required, causing short-term disturbance to approximately 1.5 acres of vegetation along the fenceline.

Table 8-21 illustrates the expected situation in year 24.

TABLE 8-21

Expected Situation in Year 24
Under Alternative 7

Livestock Forage Condition Acres	Trend	Livestock Forage Production	Possibility of Reaching Potential Livestock Production
528,154	Up	Increasing	Good
1,410	Down	Decreasing	Poor

Wildlife. The most significant part of this alternative would be the reduction of adverse impacts to the desert tortoise in the Beaver Dam Slope Allotment. Although a few tortoises that remain outside the fence would still be adversely affected by the competition for spring forage, the majority of the population would be benefited. This should allow for better reproduction; however, it would take many years for the population to show any improvement.

Most of the impacts in the other concerned allotments are the same as those for the proposed action. This alternative would improve the habitat condition for quail, small mammals, and birds. Due to reduction of competition with livestock for browse, beneficial impacts would result to deer during critical periods in those allotments important or critical to deer:

Black Canyon	North Grafton
Coalpits	Red Butte
Jackson Wash	Rock Spring
Hurricane Mesa	Sand Wash Reservoir
Lamoreaux	Smith Mesa
Mesa	

Water Resources and Fisheries. Impacts to fish would be negligible. Impacts to water quality would be more favorable than the proposed action because of increased cover on the specific allotments mentioned.

Cultural Resources. Same impacts on affected allotments as Alternative 5.

Recreation. Impacts to recreational resources would be similar to those discussed under the proposed action, although benefits resulting from improved soil and watershed conditions may occur somewhat faster under this alternative. Botanical and wildlife sightseeing values would improve much faster in the Desert Tortoise Protection Area.

Visual Resources. The landscape changes resulting from implementation of this alternative would be similar to those described in the proposed action. Additional fenceline construction would create more small scale lines on the landscape. A noticeable vegetation contrast at the fence-

line could develop in the Desert Tortoise Protection Area, becoming more visible over time as a distinct visual line.

Wilderness. The effect on potential wilderness areas would be similar to that discussed under the proposed action, although more fence would be built in the Beaver Dam Wash, if this alternative is implemented.

Socioeconomics. This alternative would be similar to the proposed action, the only difference being that adverse economic impacts would occur in the Beaver Dam Slope and Jackson Wash Allotments. The Beaver Dam Slope Allotment would receive a 29-percent reduction in Base Property Qualifications. However, voluntary stocking is now below the Base Property Qualification and this alternative; therefore, no decline in annual net income would result. The capital value loss would add $914.80 to the proposed action.

The Jackson Wash Allotment would lose 21 AUMs over the proposed action. This loss would total $201.60 in capital value, but would cause no change in annual net income, because of current voluntary low stocking rates. Because this alternative would change only the custodial areas of Hurricane and Hurricane Mesa, with no change in AUMs, it is not possible to determine their impacts without reviewing the operators' yearlong grazing schedule. Some changes in stocking procedures would result due to the change in season of use.

In those allotments where changes in season of use and restrictions to livestock grazing would result, negative impacts would occur. The magnitude of the impact would depend on such factors as the amount of AUMs reduced, season of use, effect on capital value, and net income.

The Smith Mesa Allotment would be severely impacted by this alternative. Since it would be used once every third year, it would be improbable for a continuous operation to exist. The proposed action would result in negative returns to small operations; therefore, no change in annual net income would be recognized from this alternative and no capital value would be lost.

A detailed summary of the proposed action plus the seven proposed alternatives is shown in table 8-22 for the resources which offer the

TABLE 8-22

Specific Summary of Alternatives - Long Term

	Soil Erosion (Acres)	Vegetation Livestock Forage Condition (Acres) and Forage Production (AUMs)[a]	Wildlife Habitat
Proposed Action	494,286 - Decreased 8,880 - No change 26,398 - Increased	473,519 - Increased 56,045 - Decreased 26,389 AUMs	Deer: New fences would cause increased mortality and hindrance to movement. Habitat condition for deer would improve in five allotments (51,803 acres), decline in 21 allotments (49,483 acres), and remain the same in 19 allotments (178,288 acres). Quail: Quail habitat would improve in five allotments (33,818 acres), decline in 14 allotments (48,409 acres) and remain the same in 22 allotments (240,164 acres). Tortoise: Continued competition with livestock for spring forage every third year on Beaver Dam Slope Allotment on 5,120 acres. Riparian Habitat: Decline of habitat on 20.5 miles of stream (11 percent of total riparian in ES area).
Alternative 1 - Elimination of Livestock Grazing	350,676 - Decreased 2,789 - No change 176,009 - Increased	529,564 - Increased No AUMs consumed by livestock	Deer: Increased mortality and restricted movement over proposed action due to additional fences. Improvement in browse would relieve pressure in critical areas. Quail: Increased cover and improved riparian areas would improve habitat. Decline in annuals and forbs due to natural competition. Tortoise: Improvement; no competition with livestock for forage. Riparian Habitat: Improved.
Alternative 2 - No Action	184,594 - Increased 5,951 - No change 339,019 - Decreased	15,887 - Increased 30,604 - No change 483,073 - Decreased 16,953 AUMs	Deer: Reduced mortality from the proposed action due to no new fences being built. Browse on critical areas would continue to decline. Quail: Decline in habitat due to reduced cover, downward range trend; reduced production. Tortoise: Decline. Riparian Habitat: Decline.
Alternative 3 - Restricted Grazing During Growing Season	481,055 - Decreased 48,509 - No change	526,775 - Increased 2,789 - No change 27,926 AUMs	Deer: Same impact on fence mortality and browse as Alternative 2. Quail: Improvement due to increased cover. Tortoise: Continued competition for spring forage, although reduced over proposed action. Riparian Habitat: No change.

[a]Livestock forage production (AUMs) available after objectives have been attained for each alternative.

(continued)

TABLE 8-22 (concluded)

	Soil Erosion (Acres)	Vegetation Livestock Forage Condition (Acres) and Forage Production (AUMs)[a]	Wildlife Habitat
Alternative 4 - Limited Livestock Grazing During First Grazing Cycle	494,286 - Decreased 8,880 - No change 26,398 - Increased	509,873 - Increased 2,789 - No change 16,902 - Decreased 27,926 AUMs	Deer: Same as proposed action. Quail: Same as proposed action. Tortoise: Same as proposed action. Riparian Habitat: Same as proposed action.
Alternative 5 - Delayed Implementation of the Proposed Action	494,286 - Decreased 8,880 - No change 26,398 - Increased	65,138 - Increased 2,789 - No change 461,637 - Decreased 27,926 AUMs	Deer: Same as proposed action. Quail: Same as proposed action. Tortoise: Habitat would decline until AMPs implemented. Riparian Habitat: Same as proposed action.
Alternative 6 - Increased Potential Livestock Utilization	494,286 - Decreased 8,880 - No change 26,398 - Increased	476,809 - Increased 52,755 - Decreased 26,597 AUMs	Deer: Increased forage for deer in seeding. Other impacts same as proposed action. Quail: Same as proposed action. Tortoise: Same as proposed action. Riparian Habitat: Same as proposed action.
Alternative 7 - Reduction of Negative Impacts on Selected Allotments	511,620 - Decreased 8,830 - No change 9,064 - Increased	520,532 - Increased 9,032 - Decreased 27,926 AUMs	Deer: Reduced competition for browse in some areas. Other impacts same as proposed action. Quail: Same as proposed action. Tortoise: Improvement of habitat in enclosed areas. Riparian Habitat: Habitat would improve.

[a]Livestock forage production (AUMs) available after objectives have been attained for each alternative.

most comparable factors. Table 8-23 shows a general comparison of the alternatives for the remainder of the resources which are more difficult to compare.

TABLE 8-23

General Summary of Alternatives

Alternative	Water Quality	Cultural Resources	Recreation	Wilderness	Socioeconomics Short Term	Socioeconomics Long Term
Proposed Action	+ Reduce sedimentation; improve riparian	+ Slight reduction in erosion and increased data base from site specific inventories	+ Improved resource conditions, enhanced sightseeing values	+ Improved riparian vegetation, and wilderness values	-Reduced stocking rates, season of use	+ Income increased and capital values increased as forage condition improves
Alternative 1 Elimination of Grazing	+ Increased availability; fisheries stabilized; improved	+ Ground disturbance eliminated	+ Less fencing interinterference for ORV; improved riparian	+ Enhanced wilderness values	- Loss of 28,905 AUMs of BPQ	- Loss of net income and capital value
Alternative 2 No Action	- Increased sediment further decline in riparian area	- Slight damage to archaeological sites from continued erosion	0 = No change	- Loss in wilderness values from continued ecological degradation	- Loss from 28,905 AUMs to 16,953 AUMs	- Continued forage decline and subsequent loss of income and capital value
Alternative 3 Restricted Grazing During Growing Season	0 = Gradual increase in sedimentation although no major improvement	+ Slight reduction in erosion and subsequent damage to sites	+ More rapid improvement of resource conditions	+ More rapid rate of resource recovery and subsequent enhancement of wilderness values	- Loss of spring forage on public land	- Loss of income and capital value; increased operating costs
Alternative 4 Limited First Cycle	0 = Short term benefits offset by time of implementation	+ Reduction of erosion and damage to cultural sites	+ Improvement more rapid	+ Favorable impacts to wilderness values	- Possible termination of livestock operations due to large stocking rate reduction	+ As forage conditions improve, annual net income and capital value would increase
Alternative 5 Delayed Implementation	+ Improved water quality, although over a much longer time frame	0 = Slight damage from trampling	+ Viewing opportunities would be enhanced although less than proposed action	+ Less impact on wilderness values - more gradual intrusion	- Initial impacts would be the same as No Action Alternative	+ Income lower than proposed action. Capital values would be similar
Alternative 6 Vegetative Manipulation	+ Less sediment loss in the long term	- Possible damage to archaeological sites beneath surface	+ Improved resource conditions and increased hunting opportunities; increased firewood opportunities in seedings	0 = Possibly no wilderness values in seeding area	+ Increased forage and stocking rate	+ Increased income and capital values
Alternative 7 Reduction of Adverse Impacts on Selected Allotments	+ Increased cover riparian and decrease sedimentation	0 = Slight damage from trampling	+ Improved resource conditions, sightseeing values, and enhancement of tortoise and riparian habitat	+ Vegetation improved, riparian improved, wilderness values enhanced	- Greater stocking rate reduction, alteration of existing season of use	+ Increased income and capital value

CHAPTER 9

CONSULTATION AND COORDINATION

9

CHAPTER 9
CONSULTATION AND COORDINATION

INTRODUCTION

A brief history of the consultation, coordination, public meetings, environmental staff (ES) development, contracts and a list of agencies, government and nongovernment, to whom a copy of the final statement will be sent is included in this chapter.

Consultation and coordination was maintained throughout the ES process by Bureau of Land Management (BLM) offices in Washington, DC, Utah State Office, Salt Lake City, Utah, Cedar City District Office, and Dixie Resource Area Office, St. George, Utah. Ranchers, interested public groups and individuals, Federal Government agencies, State agencies, and congressional delegates were notified by news release, radio broadcast, and letters. The first ES and allotment management plan (AMP) information news release and public letter were dated October 29 and 30, 1975. Formal public meetings were held November 5, 1975 at Hurricane, Utah, and St. George, Utah and November 12, 1975 at St. George, Utah. On November 7, 1975 a meeting to explain the ES process as it applied to Washington County was held for the State and local governmental agencies.

A public tour of the Hot Desert area was conducted February 27, 1976 and about 100 persons were invited by personal letter to attend. Another field tour was conducted for BLM Utah State Advisory Board on August 20, 1976. Copies of the news release, handouts, and lists of participants are on file at the BLM Cedar City District Office.

Every effort was made to keep the ranchers and public informed of the proposed action and the ES process. Opportunities to comment were given those individuals immediately affected, through letters of inquiry and personal contacts by members of the Cedar City District and Dixie Resource Area staffs.

A team of BLM specialists from different locations in Utah was selected to compile the baseline data and analyze impacts of the proposed action and alternatives. Team members included knowledgeable specialists in range and watershed management, fisheries biology, wildlife biology, agriculture economics, archaeology, recreation, visual resources management, land use, and a writer-editor.

Three contracts were let. One contract was let to Brigham Young University for water quality investigation; one to R. Beck and Associates for socioeconomic analyses; and a contract to the Department of Wildlife Resources for an inventory of desert reptiles. Other Federal and State agencies with special expertise in environmental statement preparation or with useful information relating to the proposed action were consulted during preparation of the draft statement. On April 8, 1977, BLM Utah State Office formally notified the following Federal and State agencies of the purpose of the proposed action and offered to establish a working relationship with their organization in preparing the statement:

1. Director, National Weather Service, Salt Lake City, Utah
2. U.S. Army Corps of Engineers, Salt Lake City, Utah
3. Director, Utah Division of Wildlife Resources, Salt Lake City, Utah
4. Director, Utah Division of Natural Resources, Salt Lake City, Utah
5. Utah State Engineer, Salt Lake City, Utah
6. Utah State Historic Preservation Officer, Salt Lake City, Utah
7. Commissioner, Utah Department of Agriculture, Salt Lake City, Utah
8. Director, Utah Division of Lands, Salt Lake City, Utah
9. Director, Office of State Planning Coordinator, Salt Lake City, Utah
10. Cooperative Extension Service, Utah State University, Cedar City, Utah

11. Washington County Commissioners, St. George, Utah
12. Five-County Association of Governments, St. George, Utah
13. Area Conservationist, Soil Conservation Service, St. George, Utah
14. U.S. Agricultural Stabilization and Conservation Service, St. George, Utah
15. Superintendent, Zion National Park, Springdale, Utah
16. Environmental Protection Agency, Denver, Colorado
17. Regional Director, Bureau of Reclamation, Boulder City, Nevada
18. Forest Supervisor, U.S. Forest Service, Cedar City, Utah

The following persons responded in writing to the letter of April 8, 1977.

1. U.S. Department of Commerce, O.R. Warner, Deputy Director.

Comments. Suggested we contact Mr. Arlo Richardson, Utah State Climatologist, since U.S. Department of Commerce had discontinued the state climatologist program several years ago.

2. Utah State Engineer, Dee C. Hansen.

Comments. He designated Gerald Stoker of their Cedar City Office to be the representative for the State Engineer. Each of the individual ranchers immediately affected by the proposed action was contacted personally and their suggestions were considered in developing the proposed action.

Because there are five allotments within Utah that are administered by Arizona BLM and two allotments in Arizona administered by Utah (Cedar City District), an interdistrict agreement with administrative guidelines has been developed and agreed upon by both BLM State Offices.

Frequent informal contacts were made with various governmental and nongovernmental agencies and individuals to acquire data for this draft. Included were Utah State University of Logan, Utah, Southern Utah State College at Cedar City, Utah, Desert Range Experiment Station, Milford, Utah, Soil Conservation Service at St. George and Cedar City, Utah,

National Park Service, Springdale, Utah, Desert Tortoise Council, Utah State Department of Wildlife Resources, Brigham Young University, Federal Land Bank, Farmers Home Administration, Five-County Association of Governments and various crop and livestock reporting services.

Comments on the draft environmental statement were requested from the following agencies and interest groups. Agencies, organizations, and individuals who responded with comments are designated with an asterisk.

FEDERAL AGENCIES

Forest Service, U.S. Department of Agriculture
Geological Survey, U.S. Department of the Interior
Fish and Wildlife Service, U.S. Department of the Interior*
Bureau of Outdoor Recreation, U.S. Department of the Interior
Environmental Protection Agency*
National Park Service, U.S. Department of the Interior*
Bureau of Reclamation, U.S. Department of the Interior
Solicitor, U.S. Department of the Interior
Soil Conservation Service, U.S. Department of Agriculture
Advisory Council on Historic Preservation

STATE AGENCIES

Utah State Clearinghouse
Utah State Historic Preservation Officer
State Engineer
Division of State Parks
Division of Wildlife Resources
Division of Lands
Office of Planning and Coordination*
Division of Natural Resources
Utah State University*

LOCAL AGENCIES

Washington County Commissioners
Five-County Association of Governments

INTEREST GROUPS

Utah Cattlemen's Association
Utah Woolgrowers' Association

Sierra Club*
Wildlife Federation
Natural Resources Defense Council
ISSUE
Friends of the Earth
Water Conservation District, St. George, Utah
Utah Environment Center
Utah Mining Association
National Parks and Recreation Association
American Horse Protection Association, Inc.
Zion First National Bank, St. George, Utah
Desert Tortoise Council*
National Council of Public Land Users*
Ada County Fish and Game League

INDIVIDUALS

James Morgan
Present Range Permittees*

Copies of the final environmental statement will be available for public inspection at the following locations:

Washington Office of Public Affairs
18th and C Streets
Washington, D.C. 20240
Phone (202) 343-5717

Bureau of Land Management
Utah State Office
University Club Building
136 East South Temple
Salt Lake City, Utah 84111
Phone (801) 524-5311

Bureau of Land Management
Cedar City District Office
1579 North Main
P.O. Box 729
Cedar City, Utah 84720
Phone (801) 586-2401

Bureau of Land Management
Dixie Area Resource Office
P.O. Box 726
St. George, Utah 84770
Phone (801) 673-4654

PUBLIC COMMENTS ON DRAFT ES

A 45-day public comment period was provided to review and comment on the adequacy of the proposal and its alternatives. The Draft ES was filed with the Environmental Protection Agency on May 26, 1978 and released to the public. The notice of availability was published in the May 26, 1978 Federal Register on page 22773. The notice announced a 45-day public review period ending July 10, 1978 and included a schedule for a public hearing in St. George, Utah on June 29, 1978. This date was later changed to July 11, 1978 and the comment deadline extended to July 18, 1978 for a total of 53 days for the comment period.

Over 350 copies of the Draft ES were mailed or distributed to the permittees, Federal, State, and local government agencies, nongovernment groups and individuals for their review and comment. The Federal R egister listed locations of reading copies available for public review, and information on how to obtain a copy of the draft statement. News releases 3 weeks, 2 weeks, and 1 week before the hearing were placed in three local papers and one Statewide paper.

Public Hearing. A formal hearing was held on the adequacy of the draft statement at the Washington County Court House July 11, 1978 at 7:00 pm. A hearing judge from the Office of Hearings and appeals presided over the hearing. The entire hearing was recorded verbatim by a court recorder.

Copies of the hearing transcript are available for review in the Cedar City District Office. The hearing panel consisted of the BLM Utah State Director, District Manager, Area Manager, and Environmental Statement Team Leader.

Approximately 60 persons attended the hearing, 12 of which presented comments.

Handling of Public Comments and Review Procedures. All written comments and transcript of the hearing are available for inspection at the following locations:

Office Of Public Affairs
Bureau of Land Management
Interior Building
18th and C Streets NW
Washington D.C. 20240
Telephone (202) 343-5717

Cedar City District Office
Bureau of Land Management
1579 North Main Street
Cedar City, Utah 84720
Telephone (801) 524-4257

Utah State Office
Bureau of Land Management
University Club Building
135 East South Temple
Salt Lake City, Utah 84111
Telephone (801) 524-4257

Dixie Resource Area Office
Bureau of Land Management
24 East St. George Blvd.
St. George, Utah 84720
Telephone (801) 673-4654

All comments were reviewed and considered. Comments which presented new facts, questioned facts, or analyses, or raised questions or issues bearing directly upon the environmental effects of the proposal and the alternatives were used in revising the text or were responded to. Comments not addressing the adequacy of the statement were not responded to in the statement.

Minor editorial and factual changes have been incorporated into this statement without acknowledgement in this section.

Individuals speaking at the Public Hearing, July 11, 1978.

Comment Number	Speaker (representing)
1.	Lola Esplin (Self and rancher husband)
2.	Don Schmutz (Dixie Soil Conservation District)
3.	Dean Gardner (Self-rancher)
4.	Dean Wallace (Self-brother ranchers)
5.	Roy Larsen (Self-rancher)
6.	Roland Hall (Self rancher)
7.	Dr. Jim Bowns (Self-range ecologist)
8.	David Ruesch (Farm Bureau)
9.	Cleo Wood (Self-rancher)
10.	Harold D. Smootz (Self-rancher)
11.	Lynn Larsen (Self and father rancher)
12.	Ted Iverson (Self-rancher)

Hearing Participant Comment Number: 5

Comment. I want to comment on this deer situation. Well, first I'll start on one of them. I have a little sheep allotment out here and they took 68 percent of it off for deer and there is not one oak, or barberry or one rock where deer --- and there is absolutely no water.

Response. The Apex Slope allotment's present base property qualifications and the proposed action are identical. There are no proposed changes on the allotment. This can be found in table 1-10 and in Appendix I.

Hearing Participant Comment Number: 6

Comment. It's mainly named Hot Desert Environmental, but there are areas close to 6,000 feet elevation and do not fit the criteria of the Hot Desert area. And I hope this will be taken into consideration.

Response. The differences in elevation were considered during the preparation of the ES. See Chapter 2, Geology and Topography section; Soils section (fig. 2-4, table 2-4); and the vegetation section (table 2-8).

Comment. And I feel that there has been alot of --- or some issues, say, poor judgment made. In particular I'd refer to the archaeological site Figure 2-19 in the back of the book. This shows that a vast amount of Washington County is listed as having from 4 to 12 archaeological sites per square mile, and I feel this is a great exaggeration. I've lived in the area all my life, and I feel this is one case where these archaeologists are biased, and there's a lot of area that shows there's 13 to 24 archaeological sites per square mile.

Response. The archaeological site density estimate was derived from existing publications and site forms, and a 1-percent random stratified sample of the project area conducted by BLM archaeologists in 1976. This is explained in Chapter 2, Cultural Resources.

Hearing Participant Comment Number: 7

Comment. On page 1-13 and 1-47 in the evaluation of the AMP, it states, and I agree wholeheartedly, that use -- we will have to use various study procedures to monitor changes in plant composition and ground cover. There are four studies basic to this evaluation. One is the actual grazing use, vegetation utilization, condition, and trend on both soils and vegetation and the climate.

I submit that these data were not available or were not complete enough for evaluation going into this Statement. Rather we relied on the ocular reconnaissance, which I'm sure everyone in this room has heard me before, I've been very critical of that. It is a method that was developed in 1905 and not subject to check. Estimates vary from individual to individual and day to day. The BLM must not be too pleased with either because recently they have abandoned this method and gone to the SCS method and are looking at other methods of coming up with this type of information.

Response. The ocular reconnaissance method used to inventory the livestock forage capacity is explained in Appendix X and BLM Manual 4412.11A. This method has been widely used and was developed in consultation with western universities. This system was not abandoned because of reliability but because additional data were needed and the new method can be used for determining ecological condition.

Comment. I read throughout this study that the ranges are in poor condition, that 42 percent of that land is in poor condition according to the SCS classification, nearly 44 percent in poor condition for livestock forage, whatever that means.

Response. Livestock forage condition is the present system used by BLM to rate vegetation as good, fair, or poor in relation to its ability to provide livestock forage. The system assesses the quality of vegetation based on the composition of desirable, intermediate, and least desirable species for each kind of livestock and considers the current and recent past evidence of soil erosion. This is explained in Chapter 2 Vegetation, Appendix X, and the BLM Manual 4412.11A.

Comment. I don't think there's enough information on this hot desert to come up with what the trend is.

Response. The trend information used in the development of the proposed action is on file in each allotment folder. Because of a lack of sufficient replication in most allotments, trend is referred to as "apparent" trend in the ES. The monitoring and evaluation studies included in the proposed action would develop sufficient replication in time to refine the available trend data. Apparent trend information, although limited, can be applied by experienced range specialists to obtain

reasonably reliable information to determine whether the vegetation is improving or declining. Apparent trend is explained in Chapter 2, Vegetation.

Comment. One concern I have also is the type mapping on this particular document, and I'm not saying this because of my familiarity with this type but I see the complete elimination of blackbrush as a vegetation type.

Response. Vegetation types and how they were derived is explained in Chapter 2 Vegetation. In Appendix VII there is a description of each vegetation type, and table 2-8 shows broad vegetative types and their major plant species. Blackbrush is shown as a major plant species in the Desert shrub type, Pinyon-juniper type, Sagebrush type, Joshua tree type, and waste.

Comment. I am concerned, though I cannot find it in here, that most of that poor condition, or at least a large portion of that poor condition is the blackbrush type. And I submitted that the blackbrush type in Washington County is not poor condition. It is an ecological climax. Data studies in northern Arizona have verified this.

Response. The BLM measures livestock forage condition as explained in Chapter 2 Vegetation and comment 7-2. The blackbrush stands are in good to excellent ecological condition but poor livestock forage condition for livestock grazing.

Comment. And the thing that concerns me as I go through this document, and I cannot pull out information that I need to either support or refute what I'm saying, we have found that ungrazed blackbrush is spinescent and low in nutrients. We've proven this experimentally. We find that the grazed blackbrush is more palatable and nutritious.

And I throw this out as an alternative that perhaps we are grazing this type too lightly and grazing should be increased rather than decreased. Maybe this is preliminary right now but I think that's what we're going to come up with on our results.

Response. Grazing capacities for blackbrush were established on vegetation composition. The desirable species in blackbrush communities would be severely damaged if blackbrush capacities were not constrained.

Comment. I am very much concerned about the change in animal numbers and season of use between the 1930s and '40s and the present time. I tried to get these data from the St. George office a while back, and perhaps I didn't given them enough lead time, but I was unable to get that information. But the discussions I had and my information indicates that the numbers of livestock have declined substantially since the 1930s and '40s all over the west and I would assume in that area.

And if so, then how can this range continue to decline and where is the data to support this conclusion?

Response. The total numbers of livestock were declined but livestock stocking rates on public land have not been reduced in line with the grazing capacity. Present livestock forage condition is shown by allotment in Appendix VIII.

Comment. With what limited information I can get on the bush muley, which seems to be the crux of the whole problem, is that it should be managed so that it is rested in July, August, and September. And we're concerned now about spring use. I would like to have this information provided to the reader so he can draw his own conclusions.

Response. The main concern for spring use regarding the Beaver Dam Slope and the Desert Tortoise is explained in Chapter 3, Wildlife, Desert Tortoise. The competition for available forage, during the spring months, between cattle and the desert tortoise would still occur under the proposed action 1 year out of 3. In dry years the competition would be most intense. However, the livestock use would be limited in the Beaver Dam Pasture to no later grazing use than April 30, the year that the Beaver Dam Pasture is grazed. The bush muhly is so limited that it is not a major forage species presently for either livestock or the tortoise.

Comment. I see too many references in this section (desert tortoise) to personal communication. In other words, we have very little empirical data and I think it's an extremely biased section. It disturbed me more than any other part of this document. I would suggest that we set up some objective research in the Woodbury-Hardy study to study, among other things, food habits, nutritional requirements, competition with livestock, and vegetation changes with livestock excluded because I assume that livestock will be excluded from this particular area. And let's get some quantitative data on this so we don't have to refer to individuals as personal communications so we have the information to support it.

Response. Emperical data used in the statement were obtained from the following references:

1. Berry, Kristin, 1976.
2. Brown, G.W. Jr., 1968.
3. Coombs, 1974
   Coombs, 1976a
   Coombs, 1976b
   Coombs, 1977
4. Hansen, Richard M., et al, 1976
5. Hardy, Ross, 1945
6. Harry, Ross, 1976
7. Woodbury, Angus and Hardy, Ross, 1948

The Woodbury Desert Study area has been set aside for research purposes and it is intended that additional studies would be made to determine the needs of the desert tortoise.

Comment. Another point that I'd like to make concerns the threatened, endangered plants. According to the document there are three plants in this area on this list, *Echinocereus engelmannii* var. *purpureus*, *Pediocactus sileri*, and *Arctomecon humilis*. Two of those three plants are cacti. To my knowledge the cacti are not preferred plants by livestock, therefore, not grazed to any great extent. Yet I read in the document, and I quote, "The rest during the growing season, along with the lighter grazing use over present levels of use, would provide these plants with the opportunity to compete with," and I quote, "the native vegetation."

These plants are native. If these plants are not grazed by animals, it would appear that perhaps heavy grazing on those areas rather than light grazing would benefit them.

Response. Not enough information is available on the impacts livestock grazing would have on these plants to subject them to increased heavy grazing. The government, by law, must not propose any action that could damage threatened or endangered species. Heavy grazing could possibly damage the plants by trampling if not by grazing. The text has been changed to explain two of the species are cacti normally not grazed by livestock. The palatability of the other species for livestock grazing is unknown (Chapter 3, Vegetation).

Comment. Another thing that I am concerned about that I don't feel competent to comment on it because I didn't get enough experience with that, and that is the amount of emphasis that is placed on the riparian community. I think it's -- my own personal feeling is it's totally out of line, it's overemphasized.

Response. See response to comment Cooperative Extension Service 10-11.

Hearing Participant Comment Number: 9

Comment. I wonder a lot of times when you come back to 1933 when the BLM was set up. It was set up definitely to rehabilitate the range, stabilize the livestock industry. I sometimes wonder like now while we're trying to make these adjustments, take the livestock industry off for one year out of three, how do you stabilize the livestock industry to do that? You just don't go in and out that way.

Response. The proposed action does not require removal of livestock from grazing on public land 1 year out of 3, that is the reason for the 3-pasture rotation system. The livestock utilize two of the three pastures every year while resting one pasture. This is explained in Chapter 1, Proposed Action.

Hearing Participant Comment Number: 11

Comment. And also on our permits that I contend with, they took the inventory by helicopter because they think it is too hard to take it by foot or otherwise because there are no roads. Now, I consider this for them to tell us how much feed is produced and they have yet to set foot on the property, that is conflict as to the means of doing things.

Response. Big Mountain Allotment was surveyed in September, 1976. A helicopter was used to facilitate travel between transects because of rough terrain and few roads. The actual survey was done on the ground. A BLM employee camped on the allotment for at least 1 month. Four vegetative writeups for each of four vegetative types and seven transects were run. This record is filed in the AMP folder for that allotment.

Comment. Because originally the permit that we had called for 178 cattle for 6 months. Well, it's been adjudicated we have 68 cattle now for five months. When the AMP goes through it will be 40 cattle for five months. Now, that's not management; that's range of limitation for the livestock. It's not managing; it's completely eliminating the livestock in this desert area.

Response. The present Base Property Qualification for Big Mountain Allotment is 490 AUMs (Appendix I). The proposed AMP carrying capacity is 325 AUMs (Appendix I and Chapter 1, table 1-10) or 62 cows for 5 months.

Hearing Participant Comment Number: 12

Comment. I don't believe there has been anyone speak here today that hasn't been interested in the livestock industry.

And still we get here in this Statement and on Page 9-5 it says, "Interest Groups." And nowhere in that list of interest groups do I see any reference made to the livestock men. I'd like to know why that is.

Response. The first page of Chapter 9 explains how the ranchers in the immediate area were kept informed. Each rancher was invited to various meetings, contacted by employees during the development of their individual grazing management plans, given a copy of the AMP and asked by letter to comment, as well as being supplied with a copy of the Hot Desert Grazing Environmental Statement Draft and again asked for comment. The present range permittees, the Utah Cattlemen's Association, and the Utah Woolgrowers Association have been added to the list of interest groups and of individuals in Chapter 9 as well as the Summary page.

Comment. I'd also like to indicate on part of my range the carrying capacity was measured last spring, one of the driest years our country has ever seen, the feed was measured immediately after the cattle was taken off, and I'd like to know how you can measure feed after the cattle have already consumed it.

Response. The Scarecrow Peak Allotment of which the Terry Allotment is a part, was surveyed in August and September of 1976 not in the spring of 1977 and not immediately after the cattle were taken off. The cattle were taken off on April 15, 1976 more than 3.5 months before the inventory was carried out. This information is a part of the record contained in the Scarecrow Peak AMP folder.

The following letters were received containing comments either of a substantive nature or regarding the adequacy of the statement:

1. State of Utah, Department of Development Services
2. College of Natural Resources, Utah State University
3. National Council of Public Land Users
4. State of Utah, Division of Water Rights
5. Department of Army, Corps of Engineers
6. Sierra Club, Uinta Chapter
7. United States Department of the Interior, Fish and Wildlife Service
8. Stonefly Society of the Wasatch Fly Fishing Club
9. United States Department of the Interior, Heritage Conservation and Recreation Services
10. Cooperative Extension Service, Utah State University
11. Dixie Soil Conservation District
12. Mr. Phillip Foremaster
13. American Fisheries Society, Bonneville Chapter
14. United States Department of the Interior, National Park Service
15. Utah Audubon Society
16. Desert Tortoise Council
17. State of Utah, State Planning Coordinator
18. Environmental Protection Agency
19. Sierra Club, San Francisco, California
20. United States Department of Agriculture, Soil Conservation Service, Salt Lake City, Utah

1

STATE OF UTAH

Scott M. Matheson, Governor

DEPARTMENT OF DEVELOPMENT SERVICES

Michael D. Gallivan
Executive Director
104 State Capitol
Salt Lake City, Utah 84114
Telephone: (801) 533-5961

Cedar City Utah RECD.

Section	Action		
DM			
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RAM B			
RAM P			
RAM V			
RAM E			
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AMP			

JUN 12 1978

May 31, 1978

Bureau of Land Management
Cedar City District Office
P.O. Box 729, 1579 North Main Street
Cedar City, Utah 84720

RE: Hot Desert EIS

Dear Sir,

The staff has reviewed the Hot Desert Grazing Environmental Impact Statement and feel that so long as procedures outlined in the memorandum of understanding dated November 9, 1977 are followed, this project will have no known adverse effects on any potential or listed National Register site. (1) We do have one concern, however, and that is the problem of 1% samples being used for the projection of archeological sites density in Figure 2-19. We feel that not enough background technical data is available for us to make the kind of determination as displayed here and our opinion at this time is that it would be difficult to make these predictions with any respectable accuracy percentages.

If you have any questions or concerns, please contact Wilson Martin at 307 West 200 South, Suite 1000, Salt Lake City, Utah 84101, 533-6017.

Sincerely,

Michael D. Gallivan
Executive Director and
State Historic Preservation Officer

pc

INDUSTRIAL PROMOTION • TRAVEL DEVELOPMENT • EXPOSITIONS • STATE HISTORY • FINE ARTS

RESPONSE: State of Utah Department of Development Services

1. The limits of the 1 percent survey are recognized; therefore, BLM will follow the intent of the November 9, 1977 Memorandum of Understanding with your office to avoid adverse impacts (Appendix III).

   In Chapter 1 Design Restrictions item 4, "Archaeological clearance would be required for all project sites prior to new construction. In addition to assurring that archaeological values would not be impaired, this clearance would conform with the requirements of the Historical Preservation Act and Executive Order 11593."

2

COLLEGE OF NATURAL RESOURCES
UMC 52
Utah State University
Logan, Utah 84322

DEPARTMENT OF RANGE SCIENCE
752-4100 EXT. 7821

Cedar City Utah RECD. JUN 22 1978

June 20, 1978

District Manager
Bureau of Land Management
P. O. Box 729
Cedar City, UT 84720

Dear Sir:

I have just reviewed the draft environmental impact statement on "Grazing Management in the Dixie Resource Area Hot Desert" and offer the following reactions.

It was gratifying to note that the BLM has learned from the reaction to the Challis EIS that the public desires discussion of a full spectrum of alternatives, from no action to highly intensive management. The conflicts of livestock grazing with other current and potential land uses are also appropriately considered.

I would like to be as optimistic about what the intended improvements and grazing management plans will gain in increased productivity, but unfortunately cannot agree. After having conducted research in and visited the area numerous times, I do not have as much faith in the rapidity of vegetational recovery as those who drafted the preferred plan of action. The major part of the plan rests on the assumption that rest during the growing season will allow the more palatable species to measurably increase in relative and absolute abundance against competition of other established plants within 24 years. This premise requires secondary succession to proceed at much more rapid rate than most ecologists have observed in desert environments. In fact, some believe that conventional concepts of succession do not hold for deserts at all.

1 The success of rest rotation grazing over the short term depends on an equitable climate. For instance, what if the rest year is also a drought year? Very little plant growth, especially reproductive efforts will result in the rested pasture. What if the programmed heavy spring use year falls on a drouth year or the year after the drouth? In either case, severe pressure will be placed on the key species. Cook's (1971) work cited indicates that spring grazing of cold-winter desert plants above rather low threshold levels (about 40% of current growth) will result in plant mortality. We don't know what these levels are for the major forage species in Washington County. Neither have there ever been any studies of the appropriateness of rest rotation grazing on hot desert ranges. All of the logic and research cited in support of rest rotation grazing has involved far different kinds of ecosystems. 2 There is no empirical basis for thinking that rest rotation grazing is a cure all for all kinds of ecosystems, especially deserts. In fact, as indicated above, there are logical reasons to doubt that it will be successful. Even if it does work

on the majority of allotments, I have reason to doubt that the trends can be unambiguously detected by the methods employed. Twenty years of experience in vegetation sampling makes me doubt whether 3 to 5 percent changes in the current years biomass of key species will be measured in a statistically meaningful fashion. 3 This level of precision cannot usually be attained by the same worker measuring with many samples the same area on two consecutive days, let alone 24 years apart. Until it can be said how close to the true mean with what probability the data are, I will question the original and subsequent numbers as being quite possibly spurious.

I feel that a safer approach would be to try rest rotation grazing plans out on a few representative allotments. If substantial monitoring does indeed show that improvements in vegetation occur after 5 years having a mix of above and below average climatic conditions, then rest rotation grazing should be implemented in the remainder of the allotments where it is tractable.

I can appreciate the pressure that BLM is under to stop the deterioration and begin improving production of many products and values on our national resource lands. I do, however, regret to see panaceas being sought. Rest rotation grazing remains an unproven approach for the lands in question. Hopefully a more cautious, rather than wholesale adoption of this grazing management approach will follow.

Sincerely yours,

Neil E. West

Neil E. West
Professor

NEW:ja

RESPONSE: College of Natural Resources, Utah State University

1. The Dixie Resource Area Manager is obligated to reduce the livestock numbers to coincide with available forage in drought years. This is explained in the last paragraph of Monitoring Programs in Chapter 1 (Administrative Procedures for Grazing Use Adjustment, BLM Manual Utah Supplement Release 4-7).

2. It is not believed that rest rotation grazing is a cure-all for range problems in all ecosystems. To avoid the possibility of further deterioration of the range resource, AMPs were developed. These AMPs were designed to balance the grazing use with the forage available and capability of the vegetative resource to sustain grazing. After implementation of the AMPs, specific monitoring and evaluating studies would be carried out during and at the conclusion of each grazing cycle. This is explained in Chapter 1 under Description of the Proposal and Monitoring Programs. Four studies are basic to the evaluation:

    1. Actual grazing use.
    2. Vegetative utilization.
    3. Condition and trend (soils and vegetation).
    4. Climate analyses.

    Data collected from these studies would be evaluated to determine effectiveness of the AMP. If the objectives are not being obtained or if there is a continual downward trend, the AMP would be modified. AMP modification would require preparation of an environmental assessment record or a supplement to the ES before significant change could be effected.

3. The monitoring and evaluation would be carried out during and at the end of each grazing cycle (usually 3 years), not 24 years. Small changes may not be readily observed, but the other studies such as utilization and actual use are helpful indicators of forage production.

National Council of Public Land Users

P. O. Box 811

Grand Junction, Colorado 81501

Paul Maxwell, President

Herbert Snyder, Secretary

3

22 June 78

District Manager
Cedar City District Office
USDI Bureau of Land Management
P. O. Box 729
Cedar City, Utah 84720

Dear Sir:

This is in response to the Draft, Hot Desert Grazing Management Environmental Statement and the proposals included therein.

Sec. 1, Pg. 4. The assumptions made by the BLM concerning proposed actions are not justified upon facts and acts of Congress.

1 1. Were Congress concerned about the Nation's need for domestic sources of food, fiber, and protection of the environment, it would not be importing meat in such huge quantities from foreign sources but would be protecting the domestic livestock producer who does NOT have a permit to use federal public lands with feed for $1.51 a MONTH for his livestock.

2 2. Proper land management of western watersheds that have an annual precipitation rate of about eight (8) inches of rainfall, and an evaporation rate of eighty eight (88) inches annually, require immediate removal and termination of domestic livestock grazing. NOT 5 years of implementation. Such an environment just is not suitable for domestic livestock grazing.

3 3. If sufficient funding for improvements to implement the proposed action were to be provided by Congress, it would have made the grazing fees pay the costs, instead of subsidizing continued destruction.

4 4. It is already evident that the cost of the necessary staffing to carry out the related "studies, monitoring, and evaluation" required for continuing the grazing management system is far in excess of the revenue generated from grazing use, without structural implementation costs. It is little more than a discriminatory, subsidizing, welfare program, that impovrishes non-permit producers, and keeps the Western farmer in a perpetual state of thralldom to the money lenders.

Chapter 8 sets forth the benefits to be derived from "Elimination of all livestock grazing". There can be no doubt that the benefits of elimination far outweigh the continuation of domestic livestock grazing unless, of course the rest of the nation is content with pouring more appropriations down the Western prairie dog hole and make it profitable to turn the BLM lands into a desert of desolation.

District Manager
Cedar City District Office 2 22 June 78

The vast expenditure of effort to produce such a detailed document is certainly appreciated. Were it twice as big, it would not justify continued domestic livestock grazing in a desert environment.

Yours sincerely

Herbert Snyder

Herbert Snyder, Secretary

Copies to: President Jimmie Carter
Senator Floyd Haskell
Senator Gary Hart
Representative John Dingell
USDI Secretary Cecil Andrus
National Resources Defense Council
The Audubon Society
Nevada Outdoor Recreation Assn.
Rocky Mountain Sportsmen's Assn.

RESPONSE: National Council of Public Land Users

1. The first assumption was taken from the Federal Land Policy and Management Act of 1976, Sec. 102(a) (7), (8), and (12) enacted into Public Law 94-579 on October 21, 1976.

2. Chapter 3 analyzes in depth the effect of grazing range land with 8 inches of precipitation and a much higher rate of evaporation. In order that the proposed action be analyzed in depth, a starting and ending time frame for accomplishment of objectives had to be established. The 5-year implementation period was an honest effort to approximate completion of all range developments given sufficient manpower and funding.

3. Congress directed that 50 percent of all moneys received by the United States as fees for grazing domestic livestock on public lands under the Taylor Grazing Act and the Act of August 28, 1937 shall be credited to a separate account in the Treasury for on-the-ground range rehabilitation, protection, and improvements, Public Law 94-579, Sec. 401 (b) (1). Additional funds are appropriated by Congress on a yearly basis to implement range developments.

4. The timely monitoring and evaluations are necessary to assure management objectives are being met or that adjustments are needed before further deterioration occurs. The staffing costs were considered in the development of grazing management plans as well as for the protection of all public land resources.

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WATER RIGHTS
442 STATE CAPITOL
SALT LAKE CITY, UTAH 84114
(801) 533 6071

DEE C. HANSEN
STATE ENGINEER
JOHN BENE
DEPUTY

DIRECTING ENGINEERS
HAROLD D. DONALDSON
DONALD C. NORSETH
STANLEY GREEN

Cedar City Utah
Section | Action
DM
ADM
AO
EIS
AMP

4

June 21, 1978

District Manager
Bureau of Land Management
P. O. Box 729
Cedar City, Utah 84720

RE: Draft Hot Desert Grazing Management, Environmental Statement

Dear Sir:

We have reviewed the Draft of the Hot Desert Grazing Management Environmental Statement prepared by your office. Since our area of interest is mainly concerning water resources, my comments are limited to that specific area.

In the report it states that a number of springs will be developed and wells drilled to supply adequate water supplies to satisfy the proposed actions. It is indicated that the total water requirements for the area involved will increase by only about 100 to 200 acre-feet annually over present levels. Nearly the entire area covered by your report is currently closed to further appropriations of both surface and groundwater. Any such application filed would have to be examined on it's own individual merits and in some isolated areas it may be possible to approve applications to appropriate water for limited stockwatering purposes.

1 It would be my recommendation that as you finalize your proposed plan you work closely with our Cedar City area office on any water rights problems you may have. The Area Engineer in the Cedar City office is Gerald Stoker, and that office is located at 154 North Main, phone No. (801) 586-4231.

We appreciate the opportunity to review and comment on the Draft Environmental Statement and if this office can be of assistance to you concerning any water rights problems or questions you may have, please contact us.

Yours truly,

Dee C. Hansen sp

Dee C. Hansen
State Engineer

DCH:JO:sp

RESPONSE: State of Utah Division of Water Rights

1. The BLM District Office in Cedar City will work closely with the State of Utah Division of Water Rights, including the Area Engineer in Cedar City.

DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, CORPS OF ENGINEERS
P. O. BOX 2711
LOS ANGELES, CALIFORNIA 90053

5

SPLED-E

29 June 1978

District Manager
Bureau of Land Management
P.O. Box 729
Cedar City, Utah 84720

Dear Sir:

This is in response to a letter from your office dated 22 May 1978 which requested review and comments on the Draft Environmental Statement for the Hot Desert Grazing Management Plan in Washington County, Utah.

The proposed plan does not conflict with any plans or projects of the Corps of Engineers. We have no comments concerning the environmental statement for the proposed plan.

1 Construction work in the Santa Clara and Virgin Rivers, Moody Wash, Leeds and Ash Creeks, and North and East Forks, all of which are streams within Washington County, will require a Section 404 Permit from the Corps of Engineers as required by Public Law 92-500. This should be noted in the DEIS.

Should you have any questions regarding requirements for Section 404 permit applications, etc., please feel free to contact Mr. Charles M. Holt, Chief, Navigation Branch, telephone (213) 688-4933.

Thank you for the opportunity to review and comment on this statement.

Sincerely yours,

NORMAN ARNO
Chief, Engineering Division

RESPONSE: Department of the Army Los Angeles District Corps of Engineers

1. Further coordination with the Corps of Engineers Area Manager shows that none of the proposed range developments are of the type requiring a 404 permit.


Druid Arch by Nelson Wadsworth

6

SIERRA CLUB *Uinta Chapter*

Box 8393 Foothill Station
Salt Lake City, UT 84108
July 10, 1978

COMMENT ON DRAFT HOT DESERT GRAZING MANAGEMENT ENVIRONMENTAL STATEMENT

The Sierra Club recognizes the controlled grazing of domestic livestock as one of the valid uses of the public lands. Our concern is for the health and welfare of that land while it is serving this purpose. It is our hope that the current planning process will be the beginning of the reversing of the historical trends referred to by the Comptroller General of the US in a report written in July of 1977 which states, "The nation's public rangelands have been deteriorating for years, and for the most part, are not improving". We appreciate the opportunity to comment at this stage of that planning process and trust our comments and concerns may be helpful.

A procedural problem results in a very strange paragraph on page 3-45. Soil studies were not yet available to the team members in the field when they wrote that they recommend chaining and reseeding in four separate areas. Availability of the report caused later writers to state that the procedure would likely not work in three of the four areas. 1 The process regulations prevent the two statements from being reconciled so that the EIS team is left in the ludicrous position of putting the two statements side by side and leaving them there. Since the EIS also states that it takes about 100 years for the impact of chaining to erase in this area, it is not a minor item.

I have some concern about the "key forage species" used. Used as keys are the forage species fairly abundant in the area, used by livestock, and expected to respond to the proposed plan favorably. They are not necessarily the most palatable or most preferred species as far as the stock are concerned. 2 Will this not lead to the situation in some areas in which the key species would flourish, but the most favored and most palatable species could decline considerably without notice due to lack of monitoring of non-key species?

One of the unavoidable adverse effects listed for vegetation (5-6) is a continued decline in vegetation due to the fact that "proposed stocking rates exceed the surveyed grazing capacity on these allotments". Alternative measures for mitigating adverse impacts are listed in Alternative 7. 3 Alternative 7 appears to be used as a contingency plan as it is referred to as a corrective measure in a number of places in the plan itself. Perhaps it would be better if the procedures in Alternative 7 were to be incorporated into the plan itself as a contingency plan. Its incorporation would seem to be of considerable importance to impacts on wildlife in certain allotments.

The expectation of spreading the costs of planned improvements over a term of five years would appear to be a very practical approach as funding in large amounts is becoming increasingly less available. At the bottom of the priority list for improvement funds must, of course, be those items which would impact the potential wilderness study areas. These areas must remain without irreversible impact until the wilderness studies have been completed, as stated in the EIS.

We are not insensitive to the impact of the consolidation of allotments on stockmen. It is most unfortunate that those allotments were separated in the near past instead of being left as the one unit they were. The choices are hard. A permittee must work with a neighbor in all areas of management of his business. Hard as it is, there can be no other choice at this point except to get on with the job at hand. Permittees who have been on the Allotment Management Plans have told the Grazing Sub-committee of the State Multiple Use Advisory Board, of which I was a member, that their allotments improved and their general situation improved working under the AMP. When their allotments improved, they were able to add stock back to the numbers they were grazing and the land did a better job of sustaining them with its new vigor. The carefully worked out AMP has proved to be effective.

The Sierra Club continues to favor a ten year tenure for permittees whose allotments are improving, and reduction of grazing fees below the fair market value when the condition of the range is being improved. As the deterioration or static trend reverses on more and more allotments, these two items could be of considerable importance to the individual stockman.

The dynamic mode of the plan is obviously good, allowing for correction of unexpected trends or situations after periodic reviews.

Generally this proposed plan would appear to have considerable merit. We hope that it and those to follow will provide a better situation in the future for the land and all the life forms it supports.

Submitted by:

UTAH CHAPTER SIERRA CLUB

Millie Ehrman

Millie Ehrman, Chair
Grazing Committee

<u>RESPONSE</u>: Sierra Club, Uinta Chapter

1. The purpose of the ES was to analyze the impacts of the proposed action on the environment. Therefore, there is no conflict. The manager has the prerogative of adopting an alternative if it will reach management objectives more easily or more rapidly than the proposed action.

2. The monitoring and evaluating studies analyze all of the vegetation within each transect. If successional changes are revealed through monitoring that indicates a need to shift emphasis to another or different key species, this adjustment could be made before desirable non-key species were severely damaged. Key species are those species that are selected for management and have similar physiological requirements as the other desirable plants.

3. Alternative 7 was developed to enhance wildlife habitat.

7

United States Department of the Interior
FISH AND WILDLIFE SERVICE
AREA OFFICE COLORADO—UTAH
1426 FEDERAL BUILDING
125 SOUTH STATE STREET
SALT LAKE CITY, UTAH 84138

In Reply Refer To (ES) SLC July 14, 1978

MEMORANDUM

TO: District Manager
Bureau of Land Management
Cedar City, Utah

FROM: Acting Area Manager
Fish and Wildlife Service
Salt Lake City, Utah

SUBJECT: Comments on Hot Desert Grazing Management Environmental Statement (draft)

We have reviewed your proposed Hot Desert Grazing Management Plan and offer these comments.

General Comments

1 The overall tone of the statement appears to imply a single use concept which lacks the base of an up-to-date multiple use plan. Reasons for these thoughts are: (1) livestock grazing appears to be a single use purpose and all other resources uses are subordinate to it; (2) Fragile areas such as tortoise habitat, water quality and riparian zones are not identified with measures proposed to improve conditions for these resource bases even if it means to eliminating livestock grazing; and (3) no reference is presented which indicate there are any uses which supercede livestock grazing. We believe if the proposal is founded on an up-to-date land use plan Alternative 7 would be the proposal and the proposal would become an alternative.

2 The proposal is written as a livestock grazing plan with little discussion of wildlife forage allocations other than the retirement of livestock grazing on inaccessible allotments (LaVerkin, Pace and Pintura) and designating those AUMs for wildlife. The wildlife AUMs in appendix II may obscure this fact and mislead the reader.

We find your purpose statement, "the implementation of a grazing management program is to maintain or improve public land resources such as soil, watersheds, vegetation and wildlife through the use of grazing management (p. I-3), not completely supported by the proposal. The statement recognizes deteriorating soil, watershed, vegetation and wildlife conditions over many parts of the area. Yet the proposed plan allows many resource conditions to degrade further or continue in below average conditions. 3 We believe the grazing plan should be designed to improve most, if not all resource conditions similar to the design in Alternative 7.

4 Mitigation "Monitor and evaluate the affects of the proposed action" is frequently cited as a mitigating measure in Table 4-1 and other places in Chapter IV; however, monitoring and evaluating are not mitigation. If these features are in the plan, they should be part of the proposed action giving full consideration to money, manpower and time. It should be clearly stated what was being monitored, how much improvement would be reached in the specified amount of time or what alternative actions would be taken if the goals were not reached in that time.

Deterioration of watersheds, water quality, riparian zones, stream habitat and fishery resources would not be checked by implementing the grazing proposal. This is not consistent with the high importance and priority placed by the administration on improving watersheds and water quality on Federal lands, and protecting them against continued deterioration. Measures to improve any of these interralated resource conditions would materially benefit the others. Comments on each of these individual resource bases follow.

Riparian habitat - Riparian habitat is important to fish and wildlife resources and is in short supply. Most of it is in poor condition throughout the project area and is continuing to deteriorate under present use. Impacts would be negative if the proposed action is implemented (Table 3-5). "Monitoring and evaluating the trend" is proposed for mitigation; however, monitoring and evaluation is not mitigation. We believe a more positive action should be taken and recommend fencing to exclude livestock grazing in the riparian habitat along with monitoring and evaluazion. Occasional water gaps or offstream water developments could be provided for livestock use.

Water quality - Implementing the proposal would not improve water quality (p. 3-60) Heavy riparian grazing contributes to poor water quality by promoting erosion and sedimentation, reducing stream shading and streambank cover, accelerating runoff and leaching of dissolved solids, and increasing coliform contamination. Undisturbed buffer zones along streams have been found to reduce these pollutants and we understand the Salt Lake City water department is incorporating this feature in its watershed management. Fencing the riparian area should produce a positive impact on water quality.

Soil erosion - riparian vegetation - Implementing the proposal would have a negative impact on riparian vegetation and streambank erosion (Table 3-1). Fencing riparian areas would allow vegetation to increase and reduce streamside trampling which contributes to soil erosion.

5 Fish Habitat - Fish habitat is limited and in poor condition. We do not believe implementing the proposal would improve it, nor is "monitoring and evaluating the effects" mitigation. The existing habitat has the endangered woundfin, sensitive Virgin River roundtail chub and Virgin River spinedace, gamefish and various non-game varieties. Reports indicate fishes were once more widely distributed here but mans activities, including overgrazing.

has eliminated much of their habitat. Proper grazing management has been shown to be highly effective in fish habitat management and restoration (p. 3-62 - 3-63) (Kimbal and Savage, 1977). We believe fencing the riparian zone, adding instream improvements and planting streamside vegetation would allow undercut banks develop and streambank to stabilize. Regrowth of vegetation would shade water to keep temperatures down and reduce sedimentation. We view this as restoration of former fish habitat which was lost or degraded primarily by overgrazing. Monitoring and evaluating its restoration progress should be part of the plan. We would hope the Utah Division of Wildlife Resources will provide fish data for your use.

Specific Comments

6 The wildlife fence diagrammed on page I-33 is an antelope fence which is designed to allow them to go under it. Since there are no antelope in the project area and deer are the major big game species, fence height, spacing between the top two wires and fence location are the important considerations. To minimize deer entrapment a fence should not exceed 42 inches in height, maintain no less than 12 inches between the top two wires and be located where footing is good, avoiding steep sidehills and loose surface materials. The wildlife fence diagram should show these features.

7 The seeding (chaining) description (p. I-36) does not provide assurances that deer have been adequately considered or that enough non-use time has been allowed for the vegetation to establish. The following considerations should recieve attention.

(1) Flexible non-use time schedule. In most desert areas natural plant regeneration takes place only every five to seven years, when two or more successive years with favorable amounts of precipitation occur (National Academy of Sciences, 1974). A study in the Alton area of eastern Kane county has determined seedings on reclaimed strip mines would be successful only 3 out of every 10 years without supplemental water (EMIRA, 1976). Erratic effective soil moisture, a factor common to the project area is the reason for failures.

(2) Transplanting browse seedlings on chained areas. The Intermountain Forest and Range Station at Provo is finding that transplanting browse seedlings gives them the necessary advantage to successfully compete with grass seeding in range rehabilitation. Seeding browse has not given the desired results.

(3) Where deer are important, plan pinyon-juniper rehabilitations to include attributes which are known to benefit deer. A summary conclusion for several million acres of treated pinyon-juniper is one of no overall impact-either positive or negative for deer habitat (Terrel and Sipillett, 1975). Important treatment considerations are presented in the reference which are important to deer.

Historic desert tortoise range in Utah is apparently limited to Beaver Dam Slope. It is recognized that the tortoise population has been declining since Woodbury and Hardy studied them in the 1940's, most likely because of overgrazing in the spring. The proposed livestock grazing plan (p. I-55, wildlife activity, K) may provide some benefits for them two out of every three years, but we believe the management of this unique resource on public lands should receive priority forage rights every year if their survival in Utah is to be assured. Livestock use should be adjusted to the needs of the desert tortoise or implement alternative 7 for the Beaver Dam Allotment.

8 Determining total annual production and monitoring utilization (p. 4-9) is not mitigation.

9 Trailing What measures will be taken to assure compliance with trailing regulations (p. I-58 and 3-42)?

10 Photos and photo descriptions in figure 2-9, p.2-37 may be reversed.

11 One time browse measurements cannot be used to draw valid conclusions other than that so much browse had been taken by something (p. 2-44). We further question these 1976 deer utilization figures ranging from 43 to 90 percent (Appendix XIII); whereas, deer utilization transects run by the Utah Division of Wildlife Resources only report 32 to 49 percent deer utilization in the same area which is significantly different.

Water quality standards are only recommended limits in Utah (p. 2-65).

12 More discussion is needed on the Utah cutthroat (Salmo clarki utah) than was given on p. 2-68. The Utah cutthroat is an extremely sensitive variety whose existence is precarious although its not on the Federal threatened or endangered list. It is classified as a gamefish by Utah law and protected under it. Utah cutthroat are endemic to the Bonneville Basin; however, they were introduced into the Santa Clara River system probably in the late 1800's. It is reasonable to believe that they were present in several tributary streams, including some in the project area. Utah cutthroat have been recently verified from the drainage in Water Canyon Creek above the confluence of Grass Valley Creek (May, 1977 personal communication). A Utah cutthroat recovery program would have to begin with stream habitat improvement.

13 No discussion was presented on the St. George snail (Amnicola = Fontilicella deserta) and a newly discussed snail (Fontilicella n. sp) proposed for threatened or endangered listing. These mollusks are found in the project locality.

14 Spring development, item 6, p. I-27. Wet areas would be retained whenever possible... If wet areas cannot be maintained around a spring, the spring should not be developed. These areas are highly important to nearly all wildlife species.

Water troughs. We suggest the water troughs be modified to provide a ground level water source for small and/or young animals and birds incapable of using the tanks or troughs. We also suggest escape ramps at both ends of the troughs and on two sides of the round tanks. These modifications have been found beneficial by the Utah Division of Wildlife Resources.

We appreciate the opportunity to comment.

Mitchell S. Sheldon

RESPONSE: U.S. Department of Interior, Fish and Wildlife Service

1. The Hot Desert Grazing Management Environmental Statement analyzes the impacts of livestock grazing management plans on the natural and human environment in Wasington County, Utah. This is explained in the Introduction, Description of the Proposal, and the Interrelationships portions of Chapter 1. The ES is not intended to discuss multiple land use recommendations not affected by livestock grazing activity. The multiple use planning system, which precedes development of grazing management plans, allocates resources to the various uses after considering constraints imposed by other potential resource uses. This is found in the Virgin River Management Framework Plan and is explained in the Interrelationships portions of Chapter 1 Description of the Planning System. Table 1-11 offers a summary of present or potential land uses that interact with livestock grazing that resulted in the recommendations for livestock management activities.

2. The proposal is a livestock grazing management plan, and not a multiple use plan.

   The BLM Management Framework Plan is a multiple use plan and it incorporates wildlife needs and their habitat requirements. This is done before development of livestock grazing management plans. This effort (allocation of wildlife AUMs) is found in the Virgin River MFP which was coordinated with the Utah Division of Wildlife Resources (DWR). According to DWR Regional office estimates, the public lands and wildlife forage allocated in the proposed grazing management plans for the Hot Desert area would be sufficient to meet the projected demands of deer. The Virgin River Management Framework Plan's multiple use recommendations (including wildlife allocations) are summarized in Chapter 2, table 1-11.

3. The environmental statement is not a decision document and Alternative 7 is available for the manager to use if he finds it would meet management objectives more readily. Your recommendations will be considered when the final plan is implemented.

4. The monitoring and evaluation mentioned throughout the statement are means of determining the effectiveness of the management proposal in order to make appropriate adjustments. Mitigation would include, but not be limited to changes in the grazing system, livestock numbers, season of use, additional range developments, or any combination of these. This can be found in Chapter 1, Monitoring Programs. A positive action would be taken if the monitoring and evaluation indicates a need. This is explained in Chapter 4, Water Resources and Fisheries, and again summarized in table 1-11 under Wildlife Activity Part B. A monitoring and evaluation plan has been developed and is being implemented as described in Chapter

4, Water Resources and Fisheries sections. This plan is available for review at the Cedar City District Office. The plan includes fencing of segments of riparian habitat in order to compare the effects of proposed grazing systems on riparian vegetation, fisheries habitat, water quality, and stream bank stability.

5. Refer to response number 7-4 Monitoring and Evaluation. Monitoring and evaluation of fisheries habitat will be a part of the proposed action. The Utah Division of Wildlife Resources, both State and regional offices have usually agreed to assist in our proposed fish habitat monitoring program. Population data were requested from Utah Division of Wildlife Resources but they were unable to supply it nor would they give BLM permission to collect the data previously.

6. The caption on the diagram has been changed. The diagram meets the criteria requested.

7. The text has been changed to allow irregular pattern and corridors or islands left in the seeding for wildlife cover. After seeding, the area would be rested from livestock grazing at least 2 years and longer if necessary. Reseeding may be necessary to finally establish perennial forage. Browse seedlings would be considered as an alternative procedure for establishment of browse. In deer use areas, consideration for their needs would be included.

8. Refer to response to comment 6-3. Monitoring, as mentioned in Chapter 4, is a means of measuring the forage utilization to determine whether management objectives (sufficient forage for the desert tortoise) are being attained. If the monitoring indicates the objectives are not being attained, management actions would be necessary such as changes in season of use, numbers of livestock, class of livestock, etc.

9. If the permit holder violates the terms of the crossing permit, subpart 4150 of the Grazing Administration Regulations will apply (procedures for handling unauthorized grazing use). Authorized trailing use would be supervised to assure compliance with the terms and conditions of the crossing permit. Terms and conditions include route to be followed, kind and number of livestock, periods of trailing use, and fees for crossing.

10. Photo captions have been corrected.

11. The purpose of the one-time transects in the area was to give specific information relative to the browse condition rather than to get only information on deer utilization. The reasons for the differences in utilization figures are unknown. The methods and procedures utilized were the same as those used by DWR.

12. Only general information on the Utah cutthroat trout is presented in the ES because this species is not present on public lands administered by BLM. The area referred to near Water Canyon Creek is located north of the ES area on private and U.S. Forest Service land. The Utah Division of Wildlife Resources letter number 17 indicates this species is not in the ES area.

13. The text has been changed to include mention of these species in Chapter 2, Wildlife, endangered and potentially sensitive species.

14. Wet areas around springs would be retained wherever physically possible. See change in text, Chapter 1. Water would be provided as deemed necessary or physically possible. Escape ramps are included as part of BLM policy in all water tanks.

STONEFLY SOCIETY of the WASATCH FLY FISHING CLUB

DEDICATED TO UTAH'S FLY FISHING FUTURE

MEMBER CLUB

TROUT UNLIMITED UTAH COUNCIL

July 3, 1978

Paul L. Howard, State Director
Bureau of Land Management
125 South State
P. O. Box 11505
Salt Lake City, Utah 84147

Dear Sir;

Normally, in the past we have been very impressed with the attention wildlife concerns have been given by the Utah office of the BLM. However, in writing to comment on the "Hot Desert Grazing Management Environmental Statement", we feel that the attention given the aquatic and riperian environments is completely inadequate.

1 The areas which have potential as trout habitat have not been identified. The areas with endangered or sensitive species have not been clearly identified. There is no indication of whether or not there are streams sections which with more protection would become important stream fisheries.

2 On page 4-10, you indicate that in order to measure effects of grazing, small stream sections would be fenced. We feel this is too general. On Figure 2-6, you indicate that fairly large sections of some streams will be mitigation areas, but at no place in the statement do you indicate what that will mean.

We feel that rest-rotation grazing will greatly increase the stress on riperian habitats. On 4-10, you indicate that before any significant fencing will be done on streams, you will allow one cycle of three years to pass. Again, we feel that this is inadequate.

In conclusion, we feel that riperian areas are crucial to water quality, sediment control, wildlife, aesthetics, and fishery quality. If there are insufficient funds available to adequately protect them, then we do not feel grazing should occur on these allotments.

Yours,

James Talley, President, Stonefly Society
Chairman, Utah Trout Unlimited

Karl Heidenreich
Karl Heidenreich, President, Order of the Royal Coachman
Pleasant Grove, Utah
Chairman, Utah Federation of Fly Fisherman

Bill Hager
Bill Hager, President, Northern Utah Fly Fisherman

331 South Main Street • Salt Lake City, Utah 84111 • (801) 521-6288

COPY - NATURAL RESOURCES DEFENSE COUNCIL -

RESPONSE: Stonefly Society of the Wasatch Fly Fishing Club

1. The text has been revised. Refer to Appendix XXV.

2. A detailed plan for monitoring riparian fisheries habitat has been developed in cooperation with the Utah Division of Wildlife Resources. The areas shown in figure 2-6 for proposed mitigation have been modified to identify specific sections to be fenced. The areas to be fenced are West Fork Beaver Dam Wash, Leeds Creek, and North Creek.

9

United States Department of the Interior

HERITAGE CONSERVATION AND RECREATION SERVICE
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Telephone 234-2634

IN REPLY REFER TO:
E3039

JUL 13 1978

MEMORANDUM

To: District Manager, Cedar City District Office, Bureau of Land Management

From: Assistant Regional Director, Land Use Coordination

Subject: Review of draft environmental statement for Hot Desert Grazing Management, Washington County, Utah (DES 78-21)

We have reviewed the subject document and are providing the following comments for your consideration.

1 We are pleased to note the recognition given by this statement to the presence of the Dominguez-Escalante Trail and the Joshua Tree National Natural Landmark. As stated on page 3-66, the proposed plan would have little adverse effect on the trail. However, we find no discussion of impacts to the Natural Landmark. We suggest that, if not done so already, the perimeter of the Landmark be fenced to provide complete protection to the natural vegetative features for which Landmark designation was made. If such fencing is not provided, we suggest that the final environmental statement describe in detail any adverse impacts which may result from continued grazing.

In addition to the Joshua Tree National Natural Landmark, two other areas within the Hot Desert area have been identified as having outstanding natural features potentially worthy of National Landmark designation. 2 Red Mountain consists of about 16,000 acres centered 12 miles northwest of St. George. The area is a sandstone mesa which includes examples of lava eskers and plant communities relatively unaltered by grazing. 3 Ripple Arch is an area of about 760 acres located 8 miles northwest of Gunlock. The area contains geologic features and relict ponderosa stands. The Inventory of Natural Landmarks of the Great Basin does not indicate that grazing has any serious adverse

effects on either area. However, we suggest that the final statement recognize these two potential landmarks, describe the effects that the proposed grazing management plan would have on the areas, and provide measures to mitigate any adverse effects.

4 The one percent stratified random cultural resource sample appears sufficient for the purposes stated (p. 2-70). However, additional archeological survey should be considered as a mitigating measure. This would broaden the knowledge of the cultural resource base in order that these resources can be better managed within the overall context of the grazing program.

A fuller discussion of the significance of cultural resources would greatly benefit the section on pages 2-70 and 2-71.

5 All four of the impacting agents mentioned on page 2-102 will continue to varying degrees with the proposal as well as without. All four factors should therefore be discussed in succeeding sections in order that all factors involving cultural resources can be considered in the decision-making process. In this context, it should be noted that impacts to cultural resources consist of changes from their original condition. Beneficial impacts on cultural resources should be emphasized. Such impacts are those which reduce the intensity of factors promoting change (e.g., improved vegetation decreases erosion and concomitant site deterioration).

Robert J. Arkins

Robert J. Arkins

RESPONSE: U.S. Department Interior, Heritage Conservation and Recreation Service, Mid-Continent Region

1. According to BLM plats, the Joshua Tree Natural Area is not a National Landmark. This area has been included as part of the Woodbury Desert Study Area for a total acreage of 2,840 acres. Livestock will be fenced out as explained in table 1-11, Wildlife Activity, J.

2. Red Mountain area does not have livestock grazing. MFP recommendation and management goals and objectives recommended continued closure of Red Mountain to grazing. This is explained in table 1-11, Recreation Activity, A.

3. No adverse impacts are anticipated from the proposed action. The Ripple Arch is located in the Desert Inn proposed allotment. The stocking rate has been reduced by 16 percent on this proposed allotment and the area would receive periodic rest, which it does not now receive.

4. Additional archaeological survey would be considered. See Chapter 1 Range Developments, Design Restrictions #4 and Appendix III.

5. The first and fourth impacting agents would not be changed by the proposed action. The second and third are covered by design restrictions and the Memorandum of Understanding Hot Desert Grazing Management between BLM and the State of Utah. Factors causing cultural resource damage not related to livestock grazing, are omitted from succeeding sections because the purpose of the environmental statement is to analyze the impacts of the proposed grazing management plan (Appendix III).

COOPERATIVE EXTENSION SERVICE
UTAH STATE UNIVERSITY
UMC 49
LOGAN, UTAH 84322

Utah State University and the U. S. Department of Agriculture Cooperating

10

July 14, 1978

Mr. Bob Dusenberry
Environmental Statement Team Leader
Cedar City District, Bureau of
Land Management
1579 North Main
P. O. Box 729
Cedar City, UT 84720

Dear Mr. Dusenberry:

Please accept the accompanying written comments on the "Hot Desert Grazing Management Environmental Statement". In my review and critique of this document I have attempted to evaluate the information and give critical review based on my intepretation of the standards set forth for the environmental statement process. Hopefully I have been constructive.

In submitting these comments I am representing the Range Science Department at Utah State University and the Western Universities Public Rangelands Coordinating Committee.

Respectfully submitted,

Roger E. Banner

Roger E. Banner
Extension Range Specialist

RER:ja

Attach.

Copies to: Dr. J. Clark Ballard, Director of Extension, U.S.U.
Dr. Doyle J. Matthews, Dean, College of Agriculture, U.S.U.
Dr. Thadis W. Box, Dean, College of Natural Resources, U.S.U.
Dr. Kenneth Creer, Utah Commissioner of Agriculture
Mr. Ben Lindsay, Utah Department of Agriculture
Mr. Hallie Cox, USFS, Region IV Office
Dr. Don Dwyer, Head, Department of Range Science, U.S.U.
Members, Western Universities Public Rangelands Coordinating Committee
Mr. Vern Shultz, Utah State Office, BLM

Specific Comments - Draft Hot Desert Grazing Management Environmental Statement

Roger E. Banner, Extension Range Specialist
Utah State University

Chapter 1

1 p. 1-3 "Purpose and Need" - I suggest adding "and stabilize the livestock industry" to the end of the last sentence in the last paragraph since this is also explicitly stated in the Taylor Grazing Act of 1934.

2 p. 1-6 "Specific Components of the Proposal" - The conversion to community allotments has many drawbacks associated which are not discussed or acknowledged.

3 p. 1-10 "Elimination of Grazing by Domestic Livestock" - Does factor three mean that use of the range as wildlife habitat receives a priority status over livestock grazing? If so, does this conform to the multiple-use philosophy in public land management required by legislation, and what are the trade-offs?

4 p. 1-14 "Grazing Systems that Incorporate a Rest Period" - I suggest that grazing be allowed in the second treatment through the entire winter-spring period. Rationale for this suggestion is to reduce the period of concentrated grazing use by dividing the herd into two groups and using two pastures during the October-January period. This suggestion may be appropriate as an alternative in Chapter 8.

p. 1-17 and 1-18 "Grazing Systems That Rotate the Delay of Grazing" - I suggest that an alternative be considered that will reduce concentration of livestock grazing use during the November-March period. This could be done by dividing the herd and using two pastures during this period (i.e., make treatments A & C the same, including the entire November to March period).

5 p. 1-22 "Range Developments" - It is the philosophy of many range management professionals that range improvement techniques and developments be applied to appropriate range areas where needed regardless of the use or type of grazing management. For example, just because an allotment is under custodial management does not preclude the need for or appropriate nature of range developments or improvements. Even though an area may have no livestock grazing taking place, there may be appropriate developments or improvements necessary for the enhancement of the resource.

p. 1-25 thru 1-36 "Specific Range Developments Proposed" - It is not necessary to go into the detailed description of development design and construction. Citation of the BLM standards (manual) is sufficient. It would be appropriate to go into detail where exceptions or special cases require something more than the standards set forth by the Bureau.

p. 1-35 Figure 1-10 uses a poor choice of photographs to illustrate a chaining and seeding.

6 p. 1-50 and Appendix IV "Recommended Decisions for Livestock Management Activities" - #1-Dichotomous keys are inappropriate for making specific suitability determinations. They may serve as useful guidelines that should not preclude site specific assessment of the situation. Also, if grazing use would not cause resource damage there is little justification for not encouraging use of the area.

7 p. 1-57 #4 - The trend studies used are an inadequate basis for assessing changes in vegetation caused by livestock grazing. Apparent trend determinations are in no way objective and do not identify and accurately assess dynamic successional changes due to climate, soils and other environmental influences.

8 p. 1-58 #5 part e - Elimination of grazing during the growing season is an impractical and insensitive approach to range management. Grazing use should be managed rather than eliminated.

Chapter 2

9 p. 2-1 Introduction--The Hot Desert is more accurately described as a part of the Mojave Desert rather than as a part of the Sonoran Desert.

10 p. 2-22 "Vegetation" - The blackbrush type is a major vegetative type in the study area which has not been addressed properly. When it is addressed properly, the range condition summary on p. 2-32 will necessarily be changed because much of the blackbrush type will fall in categories of "good" and "excellent".

11 p. 2-28 "Riparian Vegetation" - True riparian vegetation on public land in this area is very limited in amount and has been grossly overstated and overemphasized in this document.

12 p. 2-32 "Apparent Trend" - Due to the subjective nature of apparent trend assessment and the limitation of interpretation of apparent trend data, this paragraph is of little or no value. Apparent trend of "livestock forage condition" may have no relationship to ecological range condition and is a poor basis for comparisons of range health.

13 p. 2-43 "Wildlife" - Management of deer herds or any other wildlife resources to reach the potential population as suggested by DWR is not compatible with a true multiple-use philosophy. There is undoubtedly some competition with other animal species some conflict with other uses. Trade-offs are necessary for all uses. To ask the DWR how many deer are desirable naturally results in a figure that is idealistic when considered in a multiple use context. It is highly

unlikely that proponents of any particular use of the range resource will find a land use decision based on a true multiple-use philosophy completely satisfactory for their particular interest. There may be restriction on issues such as size of area, number of animals, and inconveniences associated with sharing the resource with other uses that result in a more realistic, practical use of the resource than the idealistic single use which accrues benefits to a single interest group. Not until these trade-offs are fully disclosed and understood can an objective land use decision be made.

14 p. 2-89 "Regional Economy" - How much does agricultural activity associated with use of public land contribute to trade and business in the region? Some estimates should be given if the public is to understand the trade-offs associated with the proposed action.

15 p. 2-98 "Future Environment Without the Proposal" - Assessment of the future environment without the proposed action paints a rather gloomy picture. If the data is not available to make accurate assessment of ecological site potential, how then can an assessment of the future environment be made with or without the proposed action? This entire section is based on some rather unfounded assumptions that the vegetation is going to deteriorate and other resources will follow. These assumptions are made even in light of the fact that livestock numbers would be decreased by approximately one-third. With the historical data that is available regarding levels of livestock use in the region prior to the Taylor Grazing Act, it is evident that current grazing use of the region is relatively minimal. There is evidence that much of the area is in a climatic climax condition (ref. blackbrush type). There is also available information that indicate that ranges stocked properly stabilize or improve even if grazed yearlong. The time frame for achievement of a certain level of range improvement may or may not be longer than that associated with more sophisticated and costly grazing management such as rest rotation grazing systems. With these considerations in mind, it is unwarranted to make highly subjective assessments, either positive or negative, based on very limited data and

16 understanding of ecological site potential. It is also unwarranted to assess the responsibility for all vegetative changes to livestock grazing.

Chapter 3

17 p. 3-2 #1 "Assumptions and Analysis Guidelines" - Without good data on ecological site potential and rate of successional change it is unrealistic to make proposals of time frame to reach management objectives.

18 p. 3-3 #8 - An assumption that livestock market conditions will remain constant leads to a superficial and unrealistic socio-economic analysis.

19 p. 3-3 #9 - Assuming capital values of grazing permits would not change with the proposal renders the socioeconomic impact analysis largely fiction.

20 p. 3-42 "Impact on Proposed Threatened and Endangered Vegetation" - What is known about the palatability and susceptibility of these plants to grazing? The impact assessment may be entirely wrong if these species cannot compete well with other vegetation. Current grazing levels may be shifting the competitive advantage to these species proposed as threatened and endangered.

21 p. 3-46 "Quail" - When addressing impacts on wildlife species such as quail in the Hot Desert, it may be unwarranted to make an assessment based on increases or decreases in annuals or forbs. What are the habitat requirements in regard to cover and forage? Ecological site potential for sites in the Hot Desert area may dictate that at any successional stage there would be adequate cover and forage for quail. The limiting factor may be water or something else having little to do with cover and forage. Also, based on levels of utilization associated with proposed levels of stocking, shortages of "green succulent vegetation" are difficult to imagine except due to climate. During extreme drought, competition with livestock may be conceivable but in practicality livestock would undoubtedly be removed before the critical level for quail is reached. Drought cycles may be one of the environmental influences that control populations of quail or other species in the Hot Desert area.

22 p. 3-48 "Desert Tortoise" - Assessment of impacts on the desert tortoise largely disregard the factors other than livestock grazing that influence what happens to the tortoise population. Lip service is given to other possible factors but in the end the impacts are all hinged on and assessed to livestock grazing. This vein of reasoning prevails throughout the document on impact assessment. Without definitive data this type of "catch-all" assessment is unjustified. Impacts may be better assessed if more data were available on behavior and habitat requirements. It is unwarranted to take such subjective and dogmatic posture while drawing from a limited data base.

23 p. 3-69 "Agriculture (Nongrazing)" - Reductions in the number of animals allowed on public land and season of use modifications definitely would (not "could") increase the dependency of livestock operations on private lands. Of all impacts that are assessible, this should be one of the more logical and easily assessed impacts. Asking the local ranchers would be an appropriate approach to this question.

Chapter 4

24 p. 4-1 - Chapter 4 should be of greater importance than Chapter 3. Since many of the impacts assessed in Chapter 3 are of a subjective nature and are based on limited data, a more cautious approach is in order. Mitigation should be applied and available on all allotments as monitoring studies indicate a need.

25 p. 4-10 "Water Resources and Fisheries" - By what standards will sufficient improvement of riparian vegetation or any other situation be judged? Hopefully this assessment of improvement will not be based on "apparent trend" determinations but on more objective and quantitative techniques.

Chapter 5

26 p. 5-1 "Introduction" - Since impact assessments have been made with only limited reference to and knowledge of ecological site potential it is assured that unavoidable adverse impact assessment is based on limited data and subjective or perhaps arbitrary bases. The assumptions underlying these assessments lead to unwarranted assessments.

p. 5-9 "Land Use" - There are always tradeoffs that must be made if there is more than one use of a resource. The objective of management should be to make these uses as harmonious as possible.

Chapter 6

p. 6-3 "Wildlife" - The climate of the Hot Desert area probably dictates that the plant communities will always have a large component of annuals and forbs.

27 p. 6-8 "Livestock" - Generalizations such as "grazed pastures would be less desirable for recreation use during the grazing season because of livestock presence" are unfounded. Not all people have the same biases. It is highly probable that some people enjoy seeing livestock in the area when participating in recreational activities.

Chapter 7

28 p. 7-8 "Socioeconomics" - Should the reduction in number of families engaged in rural grazing agriculture be considered an irreversible and irretrievable commitment? I think so. This document is supposed to reveal the effects of the proposed action. How much tax revenue would be lost? What additional tax burdens would be felt?

Chapter 8

(29) p. 8-5 "Wildlife" - Regarding fence mortality for deer, what level (% mortality) is currently being experienced and what could be expected in the future if this alternative were selected for the entire Hot Desert area?

(30) p. 8-5 "Recreation" - Regarding the recreation related statement about increased plant diversity, how much more diversity would be expected?

(31) p. 8-14 and 8-15 "Wildlife" - When wildlife habitat requirements are unknown or poorly defined, making these assessments as if they were known to be true is unjustified.

(32) p. 8-15 "Livestock" - If livestock numbers are at or reduced to the carrying capacity of the range, few of the adverse impacts described would be realized. Carrying capacity has been defined as that maximum level of stocking under which the range vegetation and related resources are sustained.

(33) p. 8-26 "Socioeconomics" - How would use of land and resources under other ownership be affected by alternative 3.

(34) p. 8-40 and 8-41 "Wildlife" - If deer are using browse heavily every year, it will not be rested regardless of the grazing management applied to livestock. Perhaps the deer numbers should be the object of restriction and control.

(35) p. 8-70 "Alternatives" - Another alternative should be included. It should consist of other range management practices that allow or assist in the attainment of the range management objectvies stated and should include, among other things, grazing systems not proposed in this statement.

Chapter 9

(36) p. 9-2 and 9-3 Eighteen Federal and State agencies have been selected for establishing "working relationships" with the BLM. Why is it that not one university in the state of Utah has been selected? Surely there are herpetologists, plant ecologists, animal ecologists, economists and others that could contribute much needed information if working relationships with the BLM were established.

(37) p. 9-5 and 9-6 Comments have been solicited from various agencies, groups, and individuals. Since the proposed action in this document will affect local livestock operators, why were no livestock organizations or livestock interests asked for comments?

General Comments - Draft Hot Desert Grazing
Management Environmental Statement

Roger E. Banner, Extension Range Specialist
Utah State University

The Draft Hot Desert Grazing Management Environmental Statement can be challenged due to a number of weaknesses. The first weakness is the emphatic or perhaps even dogmatic approach taken although data is weak or lacking in many instances. Impact assessment has been extended beyond objective information which allows personal biases of the writers to enter in. Another weakness is the thread of "catch-all" assessment attributed to livestock grazing throughout the document with little regard to other influencing factors. Yet another weakness is based on invalid and unrealistic assumptions from which impacts are assessed. This weakness renders a substantial portion of the document fiction.

Another weakness is the failure to fully reveal in an objective manner what is involved in the trade-offs proposed. Trade-offs and the associated costs or impacts are not consistently disclosed. Overzealous and highly derogative impacts and costs are identified with grazing use by domestic livestock while no clearly stated, quantitative cost (in AUMs, dollars, or any other relative measure) is revealed when the proposal or alternative involves exclusion or reduction of livestock grazing use in favor of other uses such as wildlife. As the document is written, it is difficult for the reader to discern what the cost (dollar or relative) of the proposed trade-off will be. For example, it is not clearly and fully disclosed what the impacts to the livestock operators and their private lands, other landowners such as the state, the county (from the tax standpoint) and the local economy in general are when livestock

are excluded or greatly reduced in favor of deer or tortoise. Yet when livestock grazing use is proposed to continue, impacts are enumerated in great detail and are often overzealously assessed negatively. This tends to weaken credibility when the limited data base used is considered.

A more realistic and adequate approach would involve taking a more cautious stance, depending heavily on monitoring and additional studies to yield information where current information is weak or lacking. There is no justification for implying adequate information is available to make the impact assessments presented in this document. It is commendable that initiation of better monitoring techniques and needed studies are proposed, for they are the most important and productive aspect of the entire document.

Since the Hot Desert Grazing Management Environmental Statement is an attempt to evaluate impacts of domestic livestock grazing on public rangelands and related resources, this critique is based on the philosophy that livestock grazing is a valid and important use of rangelands that should be given equal consideration with other uses of the range resource.

As a general, final comment, the Document is too large, providing too much unneeded information and too little pertinent information.

GENERAL COMMENTS

The responses to the general comments are included in the specific comments that follow.

RESPONSE: Cooperative Extension Service, Utah State University

1. See change in text. The suggestion was accepted.

2. Please refer to Chapter 3 Socioeconomics, Ranch Attitudes and Values, where these impacts are discussed.

3. Factor 3 on page 1-10 means that critical wildlife habitat would be considered along with the other factors only if it could not be adequately protected.

4. Alternatives for designing grazing systems were considered at the time the AMPs were developed. If the monitoring program indicates need for adjustment or change in the system, alternative systems will be considered and the AMPs revised.

5. This is true; however, the proposed action, the impacts of which this statement analyzes, does not include developments on custodial allotments for accomplishing management objectives. This would not preclude future range developments on custodial areas if new information indicates range developments are necessary. Necessary water or soil retention facilities could be constructed to protect the resource and uphold the trust guardianship of the public lands. This is mentioned in Chapter 1 under custodial management of livestock grazing.

6. The Dichotomous keys are used only as a guideline. Range suitability determinations were made by applying these guidelines to actual on-the-ground situations as related to grazing use.

7. The trend studies, their validity, and reason for using apparent trend are explained in Chapter 2 under Apparent Trend. Apparent trend information, although limited, can be applied by experienced range specialists to obtain reasonably reliable information to determine whether the vegetation is improving or declining. The monitoring program will add replication to the apparent trend information.

8. Elimination of grazing during the growing season was proposed as an interim measure on those allotments in poor condition with downward trend until the condition improves and the trend was reversed. After the allotments have improved, the grazing management plan would be implemented as proposed in the AMP.

9. See change in text.

10. The blackbrush is the dominant plant species in the Desert Shrub type and it may vary from 25 to 100 percent of the composition where it occurs. This is described in Appendix VII under Desert

Shrub. Blackbrush has been considered in the summary on page 2-32 of the DES and contributed highly to the good and excellent rating. However, that summary is ecological site condition class, not livestock forage condition class. Blackbrush is not considered highly desirable livestock forage.

11. Data regarding riparian vegetation are quite conservative. Riparian vegetation is considered to be vegetation that is associated with perennial water. There are 86.5 miles of riparian vegetation in the Hot Desert area on public land. The reason for the discussion is due to the importance of riparian areas to livestock and wildlife in desert areas.

12. Trend of desirable livestock forage species was used as an indicator of whether the range was improving or declining. It was not used to determine the condition of the range from an ecological standpoint.

13. Because inventories show sufficient forage is available for deer without conflict with livestock, multiple use trade offs are unnecessary.

14. This information is found in Appendix XVII of the draft.

15. Ecological Range Site Ratings are shown in Appendix IX. Ecological livestock forage potential is shown in Appendix I. These data were extrapolated from the Soil Conservation Service, Soil Survey of Washington County published in 1976. The assessment of the future environment was based on analysis of the present condition and trend under existing grazing practices and as it relates to the ecological site potential. Although there would be reductions in grazing use, the level of use would be too high to permit recovery of the vegetative resource due to grazing during the growing period and utilization of preferred forage species in vegetation communities composed primarily of less desirable forage species (for example, blackbrush).

16. The Hot Desert Environmental Statement was written to analyze the impacts of a livestock grazing management proposal upon the natural and human environment. Therefore, analyses are based on the impacts from livestock grazing and the change from the present grazing methods to the proposed grazing methods or systems. Impacts from other activities on the natural resources are considered as they interrelate with the livestock grazing management proposal.

17. A time frame was necessary to analyze the proposed action and to determine benefit cost ratios. Without such a time frame, there wouldn't be a measurable "yardstick" to determine whether management goals were being met in a timely manner. Ecological site potential information was available from SCS and was used in development of the time frame.

18. It is recognized that market conditions will change over a time period (Appendix XVIII). However, holding marketing conditions constant is necessary to establish a base for analyzing the direct impacts on the permittee.

19. BLM does not recognize or participate in establishing capital values for grazing permits. Permit values are established by a function of marketing forces outside of BLM control. A fixed capital value, after reductions in the permit grazing preference is necessary to make any social economic analysis.

20. The text has been changed to reflect that two of the species are cacti and the palatibility of the other species is unknown.

21. See Chapter 2 Wildlife section, Game/Birds, for the habitat requirements of quail. Studies conducted in Utah, New Mexico, and Arizona show food and cover availability are the most influencing limiting factor. The desert environment, with its general scarcity of water, but abundance of plant life adapted to such climatic conditions (including animals, forbs, and desert shrubs), promises most suitable quail habitats. The most critical competition for quail, therefore, for food and cover is with livestock grazing. Unless an extremely severe drought occurs, seriously reducing desert plant life, quail populations will maintain themselves provided competition with other uses is not prohibitive.

22. As previously stated, the Hot Desert ES analyzes the impacts of livestock grazing upon the natural and human environment. Definitive data relative to the tortoise are limited. However, the information that had been collected is sufficient to assure that heavy livestock grazing, particularly spring grazing, does and has influenced the desert tortoise and the relative health of its population.

23. The text has been changed from could to would.

24. This is addressed in Chapter 1, Monitoring Programs. As monitoring and evaluation are carried out, needed management changes would become evident and can be initiated.

25. It would be judged on a comparison at any point in time with its biological potential. This is discussed in Chapter 2, Fisheries Habitat. Also, see response to DWR 17-44.

26. Ecological site potential was available from the SCS Soil Inventory of Washington County (1976) and was used in the analyses of the impacts to vegetation.

27. Text has been changed; entire paragraph has been deleted.

28. It is not known how much tax revenue would change. As livestock numbers are reduced, tax revenue from livestock and ranching operations and income would be reduced. As the forage improves and stocking rates increase, tax revenues would increase.

29. There are no specific data available in regard to percent mortality currently experienced. Observations of mortality (deer hung up in fences) have been made. These losses generally occur during the winter months at which time winter stress creates weakened conditions to the animal which, coupled with migrations that require negotiation of fences, often result in deer mortality. Proposed increases in fencing, especially located across migration routes, would increase hazards to deer movement, thus increasing mortality. An estimate of the percent increase cannot be made because of too many variables, i.e., fence location, number of deer moving along a particular route, fence height, winter severity, etc.

30. It is expected that complete elimination of livestock grazing on public land would result in a gradual change in vegetative composition tending toward ecological climax. It is not known how much more diversity could be expected.

31. The assessment was made with available ecological potential.

32. The reason for the continued decline would be the continuous use without rest during the growing season. See response 10-15.

33. Other ownership was considered in that during the period when the livestock are removed from public lands, they would be either grazing on other lands or fed hay.

34. Deer populations are managed by the Utah Division of Wildlife Resources. Therefore, alternatives for managing deer populations were not discussed. Deer use of browse is generally winter seasonal. However, the combined use of the same browse by livestock and deer during the winter months and the continued use by livestock would lead to decline in the capacity of the range. In cooperation with the DWR, annual browse studies are conducted to monitor utilization, condition, and trend. If deer numbers become excessive for the area, harvest goals would be increased.

35. Refer to response 10-4.

36. The University of Utah, SUSC, BYU, and the Cooperative Extension Service have all contributed data for this statement. This is mentioned in Chapter 9. Copies of the draft statement were sent to representatives of these universities and the Cooperative Extension Service with a request for comments.

The DES listed the Cooperative Extension Service, Cedar City, Utah as an agency that had been selected for establishment of a "working relationship". This should have, more correctly, been listed as the Cooperative Extension Service, Utah State University. The Extension Service provided a full-time range specialist to work as a liason with BLM on the ES program. Primary responsibilities of this position included providing BLM with technical guidance and data, distribution of public information, and participating in reviews of the preliminary DES. Dr. James Bowns and Roger E. Banner shared this assignment.

37. All of the permittees were sent copies of the proposed action as it was developed in 1976. Also, they were sent copies of the environmental statement with letters requesting their comments. A list of all of the agencies and individuals asked for comment is on file at the Cedar City District Office and is available for public review. Copies of the DES were also sent to the Utah Cattlemen's Association and the Woolgrower's Association.

11

DIXIE SOIL CONSERVATION DISTRICT

ST. GEORGE, UTAH

July 17, 1978

Mr. Morgan Jensen, District Manager
Department of Interior
Bureau of Land Management
1579 North Main
Cedar City, Utah 84720

Dear Mr. Jensen:

In as much as the Dixie Soil Conservation District is a subdivision of State Government, and was established to carry ou a plan for the conservation of soil and water resources within the district, we are submitting some suggestions for consideration in the final draft of the "Hot Desert Grazing Management Plan".

The Dixie Soil Conservation District area encompasses all of Washington County with very little exception. In as much as the board of supervisors of the Dixie SCD are elected or appointed (three elected, two appointed.) by the local people, we feel a strong responsibility to voice our concerns because the areas in question along with other areas are the prime watersheds for the people who reside within the boundary of the SCD.

We hold the public lands are held in trust and must be devoted to the highest possible use for the permanent good of all the people. We are concerned about various impacts. The environmental impact is one of our concerns. The economic impact of permitees and social impacts of the communities is of major concern to us also.

The following items will reflect our concerns and we expect to see them become a readable part of the "Hot Desert Grazing Management Plan". These comments are not listed in number priority.

Item #1: Local input from permittees, and or local grazing boards!

1 In as much as the lands in question are grazed by stock owned by local residents we feel that there has been very little, if any input come from these individuals or groups. Nothing, in readable form, can be found in your voluminous document that spells out anything related to who, what, where, and when. We strongly urge that where an almost immediate condition of economic stress will be placed upon permittees in some allotments, they be given opportunity to suggest alternatives to the presently proposed plans of action in the draft E.S. These alternative actions should be listed by allotments and become a permanent record to be used by both the land administering agency and the users.

DIXIE SOIL CONSERVATION DISTRICT

ST. GEORGE, UTAH

2 We strongly urge cooperation between the land administering agency and land users to the extent that plans of action for land use be a cooperative effort and not another bureaurcrat mandate. That proposals be jointly agreed upon, and methods of implimentation be of joint effort also. Whatever happened to the "Grazing Advisory Boards" authorized by the Federal Land Policy Act as it relates to Washington County? Did an advisory board have any input with this E.S.? If so, where can it be found?

Item #2: Section 208 of Public Law, 92-500.

We find very little addressed to the non-point pollution problem of this law, in the E.S. The Dixie SCD recommends that more consideration be given to the feasability of the placement of structural facilities in our upper watershed areas to help contain run-off that brings endless tons of silt, sediment, and salts into our lower streams and eventually on to our irrigated lands. We would like to be a part of the decision making body as it relates to this problem. The 24 years as propsoed in the E.S. is too long to get some of our problems solved.

Item #3: The Proposed Management Plan versus the Present Plan.

3 We are not at all convinced that the proposition of eliminating individual allotments to a joint use of a new enlarged allotment, will be an improvement over the present method. In fact, we see a situation that would have a reverse effect. Under the present plan of use, individuals have more of a sense of pride for the land, and would be more apt to use and treat it better than if he was one in a group. We urge land administering agencies to allow individuals to perform range improvement practices on lands they use. This of course would

4 be based on several practicability factors. Where are the funds to come from?

Item #4: Wilderness areas.

The Dixie SCD believes that more than enough wilderness areas have been established. We therefore recommend that no addtiional areas be designated as wilderness areas.

Item #5: Warner Draw Watershed Work Plan, Dated October 1968.

In as much as the Dixie SCD is the major sponsor of the Warner Draw Watershed Program, we feel that several items in the work plan that were agreed upon by the BLM, is not mentioned in the E.S. We think

DIXIE SOIL CONSERVATION DISTRICT

ST. GEORGE, UTAH

Morgan Jensen -3- July 17, 1978

the BLM should be consistent in their recommendations for land treatment. We suggest you refer to the Warner Draw Watershed Work Plan pages 41-51 and 79. We would like your response to these questions about the Watershed Work Plan.

(5) In the E.S. page 1-60, it states that much of the land treatment work, such as erosion check dams, reservoirs etc. has been completed. If any of this work has been done in the areas designated by the work plan, we are unaware of such and would like to be shown what was completed when and where.

We feel the items above should be considered in the "Hot Desert Grazing Management Plan". These concerns are not only our own, but also permittees that we have taken the occasion to talk with.

Sincerely yours,

Don F. Schmutz

Dixie SCD Board

St. George-	Don F. Schmutz, Chairman
Hurricane-	Flint Wright, Vice Chairman
Ivins-	Jack Reber, Member
St. George-	Robert Chamberlin, Member
Rockville-	Leon Lewis, Member

RESPONSE: Dixie Soil Conservation District, St. George, Utah

1. Chapter 9 gives dates, times, and numbers of participants in public meetings and tours concerned with Hot Desert. Each of the individual permittees was consulted concerning his permit and the proposed action. Permittees were also sent copies of the proposed action and asked by letter to comment. Copies of their comments are included in the Allotment Management Plan file. A copy of the draft was sent to each permittee along with a letter asking for comments.

2. A new advisory board has been elected by the permit users. This board has had only one meeting to date. This draft statement was completed before the advisory board held its first meeting. The advisory board was elected February 28, 1978. Their first meeting was held May 19, 1978.

3. The consolidation of allotments would make a range unit that would be managed on the basis of resource needs, and of a size that would offer greater benefits to cost of needed range developments.

4. The funds for range improvements can come from either the rancher himself or the Federal Government. Congress directed that 50 percent of all moneys received by the United States as fees for grazing domestic livestock on public lands under the Taylor Grazing Act and Act of August 28, 1937 shall be credited to a separate account in the Treasury for on-the-ground range rehabilitation protection and improvements, Public Law 94-579 Sec. 401 (b)(1). In addition, Congress appropriates funds on a yearly basis for grazing management.

5. The Warner Draw Watershed Plan is mentioned in Chapter 1, Interrelationships section. The following work was done by BLM in support of the Warner Draw Watershed Work Plan:

1.	Little Creek Mountain Seeding	750 acres
2.	Little Creek Mountain Reservoirs	2
3.	Little Creek Mountain Cattleguards	3
4.	Little Creek Mountain Grazing Management Plan	
5.	Gooseberry Seeding	3,500 acres
6.	Gooseberry Reservoirs	4
7.	Gooseberry Division Fence	
8.	Oak Spring Pipeline	
9.	Gooseberry Cattleguards	2
10.	Gooseberry Grazing Management Plan	

An additional 1,800 acres of seeding, two cattleguards, and three reservoirs are proposed on Little Creek Mountain, as part of the proposed action addressed in this draft statement.

12

St. George, Utah
July 13, 1973

District Manager
Bureau of Land Management
P.O. Box 729
Cedar City, Utah 84720

Dear Sir:

I have enjoyed very much reading the Draft on (Hot Desert Grazing Management) Environmental Statement. It contains an enormous amount of good information for all of us and should generate a lot of thinking among livestock people as well as those envolved with the BLM. The fact of the matter is I have not yet studied my way through the entire book, but have enjoyed most of it. It provides us with a great amount of information on grasses, shrubs etc. but many other things are mentioned which should add to our wisdom. I should say that I enjoyed the meeting held here in St. George the evening of July thirteenth. It was well conducted and everyone, who wished had a chance to express himself. We were advised in this meeting that we could send in written comments and your letter of June 6th, indicated that we could.

First I should like to say that I did enjoy studying the book and will let it go at that and will try to mention a few things that I should like to comment on or mention.:-----

#1--I am a livestock man and admit my thinking is slanted that way and I am very much in sympathy with their numerous problems. In your comments at one point you mentioned the fact that many of the livestock people were not capable of keeping records of their operations. With this darn business of ours we just don't get a pay check at the end of a pay period and put it in the bank and then write out checks as we have run bills during the month. It just seems like we have all kinds of problems that we meet with as sickness in cattle, shipping them, buying feed, paying grazing fees, keeping up waters; well there are any number of things we have to record. Now I admit that all of us could improve on this but I kinda feel as tho you are a little too severe with us in the book.

1 #2--I think if individuals were to read this book they would definitely come to the conclusion that livestock have done all the damage to the west that has ever been done. You talk of compaction--the livestock have done it. You talk of loss of grass and browse,-the livestock have done it. You talk of riparian areas and their decline--now again the livestock have done it. You n speak of Livestock and deer running on the same allotment. You never mentioned anywhere in the book that I have yet found that the deer may have had a little to do with shor. feed and some compaction. It seems a little hard for me to accept the fact that livestock have done all the damage and game have done none at all. What do you think?

#3--There is a general feeling among livestock people that all of this is being done for the Sierra club and other such clubs and the environmentalists. We livestock people feel that there is little charity left in the BLM for them. I don't agree with all this. I was on the Arizona Strip Grazing board for 24 years and was chairman for many years. My experience was that I met some of the finest men, whom I had ever met and they were with the bureau. But the book really does not do us justice and still I know why it came about that you had to make these studies and so had to mention many things that seemed like kid's play to us.

#4--Before the arrival of the Taylor Grazing act people here in the west ran on the open range and the way it was done was not good. Throughout the years the BLM has been active and things have changed. I remember in our early meetings regarding problems on the Strip we were told by the bureau that we must fence our plans, provide the necessary water and keep our animals from straying. In other words they urged us to make private allotments which we did. We worried about it because previously our cattle could drift with the storms etc. and we thot these

fences would be our ruin. Well, years went by and we discovered that the fences were good for us and that private allotments were best. We have more freedom to decide issues by ourselves and with the bureau and we don't have to wait for others to decide. It is easier to run cattle and much more pleasant. We would prefer to have our allotment (Fort Pierce-Warner Valley) remain as it is if you see fit.

2 #5--The book indicates that off road vehicles will be encouraged to come into the Warner Valley-Fort Pierce area and I assume continue to sand mountain. We had been of the opinion that you were not encouraging this, I think it was in an early meeting last spring that you mentioned Warner Valley as an ORV areabut it seemed you concluded otherwise as I was informed by the local office. We dread the thots of having them over running that country. If you want to view the damage they can do in a hurry just look at some of the sandpatches in Warner Valley and the blue clay knolls north of Fort Pierce.

#6 During the grazing seasons on these allotments in 1976-1977 and 1977-78 we thought we should watch the land carefully and we did pull cattle off and cut down our grazing during those periods. We think it was right and we would like to work with you on a program out in the area and hope that all of us involved can arrive at something good for the area. We would like a longer grazing season than suggested.

#7--I seem to get the feeling out of the draft that people don't like to see cattle grazing on the public lands and their odors and dung sickens people. Contrary to that thinking has been my experience. We have been in the livestock business for many years and during these many years we have had people from California, Utah and other areas come and visit with us and go to the ranch. You can't make me believe that these people don't enjoy seeing cattle and fooling with them. Many times we have been working cattle near the highways which are traveled by people from all over the U.S. Often cars will stop and watch our boys as they handle the cattle. They enjoy it.

3 #8-- I notice on various occasions in the book various organization are mentioned to whom you have sent information, asked for information or had contact with. You may notice that you have failed to mention any livestock organizations that you have sought information from or corresponded with. Wouldn't it be wise to have close contacts with those people who, it appears, are going to suffer the most from your future plans?

#9--In some of our areas where we run cattle we have built reservoirs, and made other water improvements. We have discovered that wildlife also discover these water holes and take advantage of them. You might give us a little credit.

I want to say again that I enjoyed the book and have more reading to do. I hope that out of it all we can work together and make it possible for the livestock men who are now operating to continue to do so. According to your book the livestock in Washington county has little value to the County's economy, but I do feel that this does help. If you observe quite closely you will find that these livestock people usually have their own boys with them. The boys learn to work. They are kept busy and are not as apt to get involved in bad company. To my way of thinking this is one of the great goods that come from the livestock business.

I have observed over the years that the BLM tries to take young people especially during the summer and give them work. If the department could, in its deliberations keep in mind the young lads who are involved with their dads in these ranches it might turn out to be one of the great things the department has done.

Yours very truly, Phil Foremaster

Phillip Foremaster
492 East 100 South
St. George, Utah 84770

<u>RESPONSE</u>: **Mr. Phillip Foremaster**

1. The Draft Hot Desert Grazing Management Environmental Statement was written to analyze the impacts of the proposed livestock grazing management plan and, as such, analyzes the impacts of the proposal on natural and human environment, soils, vegetation, wildlife, water resources, fisheries, other land uses, and socioeconomics. Brief introductions explaining this interrelationship are supplied as introductions to Chapters 2 and 3.

2. Table 1-11, Recreation B, recommended opening Warner Valley and Sand Mountain to ORV use. However, the third column under the heading "Recommended MFP Decision" excludes Warner Valley from this recommendation and limits ORV use to roads due to the fragile watershed.

3. The first page in Chapter 9 explains the meetings held, tours, and contacts with individual permittees made by BLM. Each contact with the individual permittees concerning the proposed action and the environmental statement is a matter of record and is included as part of the AMP folder.

American Fisheries Society

BONNEVILLE CHAPTER
4332 Noal Drive
Salt Lake City, Utah 84117

13

July 14, 1978

Morgan S. Jensen, District Manager
Cedar City District
U.S. Bureau of Land Management
Cedar City, Utah

Dear Mr. Jensen:

This letter contains our comments on your draft Hot Desert Grazing Management Environmental Statement.

As you may know the Bonneville Chapter is made up of professional fisheries scientists working in Utah, and as such we represent the American Fisheries Society. We are concerned about the conditions which lead to the deterioration of aquatic-riparian habitats and fisheries on public lands in Utah. It is our opinion that livestock grazing is the single most important factor which has led to the demise of fisheries in Utah, and the rest of the west, since the settlement of man.

In view of the lack of considerations given by BLM grazing plans in the past for fisheries and wildlife resources, as shown by poor habitats on public lands in the west, we assumed the suit brought against BLM would spur the BLM to preparing a full disclosure document of existing land/water resource conditions and begin to develop grazing plans based on a multiple-use concept. Hopefully then, fisheries resources would be given proper and adequate considerations in land management; something which they have not received in the past. We find, however, in review of this environmental statement (ES), that livestock grazing is still the primary oriented land use and all other resources, especially aquatic-riparian habitat and fisheries, have been given inadequate management consideration.

1 We understand that the staff fisheries specialist who prepared the original fisheries section of the ES was not involved in subsequent draft reviews leading to this draft ES, and that the fisheries section was rewritten several times by staffs other than a fisheries specialist. Much of the present fisheries section, we further understand, does not represent the specialist's work or ideas. If this is the case, there is a question of professional integrity when the opinions of a specialist are modified or ignored when they do not agree with administrative opinions.

2 The aquatic-riparian habitat conditions in the ES area are mostly in poor or fair condition. This has resulted from long-term human activity in the area, coupled with natural geomorphic conditions of the area. Current habitat conditions are neither natural nor normal. These habitats have deteriorated from pre-settlement conditions, but appear to have reached an equilibrium level, albeit at a level well below original conditions. It is not proper, therefore, to refer

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to the area's "natural" high erodibility in the ES, since a large percentage has resulted from past human use and abuse.

3 Contained in the ES is a statement (Pg I-3) saying, "... the implementation of a grazing management program is to maintain or improve public land resources, such as, ...vegetation and wildlife through the use of grazing management." The ES further recognizes the deteriorating and poor condition of the habitats in many areas. However, the proposed plan still allows for further habitat deterioration. We feel the grazing plan should provide for habitat recovery and eventual improvement of all public land resources now being impacted by livestock grazing. It would appear then, that Alternative 7 should become the proposal.

4 Under the ES proposal we can not see how aquatic-riparian habitat and fisheries can be improved. Unlike moister areas in other parts of the west, riparian areas in the hot desert and southwestern U.S. are far less responsive to changes in grazing management. Removal of all livestock from riparian areas produces an increase in riparian vegetation, as has been shown in many studies. However, this improvement is most often lost by reintroduction of livestock. As you note in the draft ES, livestock congregate in riparian areas, the improvement which might result from a rest period would be lost when livestock again utilize an area. In assessing the impact of livestock removal, the long-term effects must consider this action of livestock. So, because livestock will negate any improvement from the rest period, the long-term will show little or no change from current conditions.

5 Since you plan to continue grazing in riparian areas, including grazing in some riparian areas with fisheries that have been closed to grazing in the past, you can expect no habitat or watershed improvement under the proposal. Climatic conditions will also contribute to the quality of present and future conditions. The general pattern for the area is low winter precipitation and intense summer thunderstorms. These storms can produce flash-flooding, often very rapid and deep, that causes severe erosion. A well developed riparian vegetation zone can moderate impacts on streams, reducing erosion and stream instability. With the proposed rest-rotation grazing program, the needed development of the riparian vegetation, particularly the woody perennials with a well developed root system will not occur at a rate which would provide protection. The frequency of floods combined with the livestock use will mean that little or no improvement will be realized under the proposal.

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The fisheries section lacks clear narrative data of all stream areas for
6 habitat conditions, number of coldwater/warmwater game/non-game fishes, en-
dangered, threatened, and sensitive species, and the potentials for habitats
and fishes improvements and management. More narrative is warranted on the
7 Colorado River cutthroat and the Utah cutthroat, both sensitive species within
the ES area. It would seem that the BLM should be concerned for the types of
8 fisheries on public land aquatic habitats, and we wonder why adequate fisheries
data is not displayed within the ES. It would seem also, that since grazing
9 will continue more or less its present use of the area, that riparian habitat
and fisheries have received inadequate considerations because of this single
oriented proposed land use.

10 Chapter IV mentions a plan to monitor and evaluate grazing impacts to riparian areas and fisheries. If a plan is cited with the proposed action it should be part of the ES to show what resource parameters will be monitored, at what intensity, at what location for what duration, and what management actions will result from the plan. The mitigation measures should be specifically pointed out in Chapter IV since to monitor and evaluate are not mitigating measures.

11 We cannot understand why BLM has failed to consider aquatic-riparian habitats and fisheries within its multiple-use resource management program for the ES area. Certainly, these considerations are mandated to BLM under such laws as the Federal Land Policy and Management Act, Federal Water Pollution Control Act, Salinity Control Act, Endangered Species Act, and Executive Orders 11988 and 11990 for example. Instead of planning around grazing as the primary item in the area, the ES should have considered all resources adequately based on the capability of the land, past and present, to support such uses, and as such provided for the protection of aquatic-riparian habitat and fisheries as mandated by the courts, laws, and the land.

12 We view the wise management of aquatic-riparian habitats as the key to a good land/water management decision for fisheries, water quality and related downstream uses of water for public and private users. A resolution recently passed this spring by the Bonneville Chapter is attached for your information. This resolution supports management protection of aquatic-riparian habitats on public lands in Utah. We note however, that while the BLM has afforded some protection of these crucial habitats in the past, in very limited stream areas, this ES fails to consider adequate management of a limited, but critical resource over a large area of public land in southwestern Utah. We hope future BLM ES's in Utah will stress the need for complete and adequate inventory information as well as full disclosure of resources conditions geared to multiple-use management. If proper management direction is not given, we foresee continued resource deterioration and loss on public lands.

American Fisheries Society

BONNEVILLE CHAPTER
4332 Noal Drive
Salt Lake City, Utah 84117

We hope these comments will be helpful to you in assessing the draft ES.

Sincerely yours,

Donald A. Duff

Donald A. Duff, President

cc: American Fisheries Society
Natural Resources Defense Council

American Fisheries Society

BONNEVILLE CHAPTER
4332 Noal Drive
Salt Lake City, Utah 84117

RESOLUTION

IN SUPPORT OF RIPARIAN AND AQUATIC HABITAT
MANAGEMENT ON PUBLIC LANDS

WHEREAS the National Environmental Policy Act of 1969 establishes a national policy requiring all Federal agencies to give full consideration to environmental effects in planning and carrying out their program, recognizing the critical importance of restoring and maintaining environmental quality to the overall welfare and development of man; and

WHEREAS the Federal Water Pollution Control Act of 1972, as amended, was passed with the objective of restoring and maintaining the chemical, physical and biological integrity of the Nation's waters; and the Multiple Use and Sustained Yield Act of 1964 and the Federal Land Policy and Management Act of 1976 provides for protection of areas within the public lands where special management attention is needed, including the need to protect and prevent irreparable damage to fish and wildlife resources or other natural systems or processes; and

WHEREAS the President of the United States, in May 1977, recognized the needs of the Nation to provide adequate management and planning considerations for the protection of wetland riparian and floodplain zones by the issuance of Executive Orders 11988 and 11990 for these areas respectively; and

WHEREAS studies have shown that riparian-aquatic vegetation is very important for the maintenance of both aquatic and terrestrial ecosystems, and to water quality; and riparian-aquatic habitat zones have not, in the past, received adequate management and planning considerations by Federal land management agencies, now, therefore, be it

RESOLVED that the Bonneville Chapter of the American Fisheries Society at its spring meeting May 18, 1978, urges the U.S. Forest Service, USDA, and the Bureau of Land Management, USDI, to include riparian aquatic zones under special management plans which consider the value of the vegetation to both the natural ecosystems which they form, and forage needs of wildlife and domestic livestock and (2) supports the initial efforts of these two agencies to fence, study and monitor riparian-aquatic zones for the protection of fisheries, wildlife, and water quality resources, as well as other multiple-use resources, and that the Bonneville Chapter encourages continued efforts in this direction by all land management agencies concerned; and be it further

RESOLVED that copies of this resolution be sent to the following:

President of the United States
Secretary of the Interior
Secretary of Agriculture
Chief, U.S. Forest Service, USDA
Director, Bureau of Land Management, USDI
Governor, State of Utah
Utah Congressional Delegation
Director, Utah Division of Wildlife Resources

American Fisheries Society

BONNEVILLE CHAPTER
4332 Noal Drive
Salt Lake City, Utah 84117

Utah State Director, Bureau of Land Management
Regional Forester, R-4, U.S. Forest Service
Administrator, Environmental Protection Agency
Director, U.S. Fish and Wildlife Service
Area Supervisor, Fish and Wildlife Service
National Audubon Society
Izaak Walton Leaque
Defenders of Wildlife
Wilderness Society
Sierra Club
Utah Chapter of the Wildlife Society
President of the Western Division of the American Fisheries Socity
President of the American Fisheries Society
Sport Fishing Institute
Trout Unlimited

ATTEST: Victor J. Starostka
Secretary-Treasurer

Donald A. Duff
President

RESPONSE: American Fisheries Society, Bonneville Chapter

1. The original ES team member responsible for the fisheries section of the ES was an ad hoc team member assigned from another District Office. After completion of assigned work (technical report), he was reassigned to duties at his District Office. While the original team member had only limited participation after completion of the technical report, further input was received from two other BLM fisheries specialists.

2. It is commonly accepted that much of the ES area's poor erosion condition has been caused by past use and poor management. Also, please note that SCS rates the natural soil erosion hazard conditions to be mostly (over 70 percent) moderate to high erosion.

3. Alternative 7 is available for consideration by management. See response 6-3.

4. The proposed action includes mitigating measures in addition to those set forth in Chapter 4 to insure improved fisheries and riparian habitat. If after one grazing cycle (3 years), the benefits of rest have not improved fisheries or riparian conditions, other actions would be taken, including, if needed, the fencing of riparian areas. Such a management commitment would assure that adverse long-term impacts to riparian fisheries habitat do not occur.

5. The proposed action combines 84 allotments into 59 new allotments. One of the 59 new allotments (Bull Mountain) would include grazing riparian habitat on two of three pastures not previously grazed. It was predicted this would result in a short-term negative impact, as identified in Chapter 3 (Soils section, Stream Erosion) on 804 acres. Should this adverse impact persist, the proposed monitoring program would identify the adverse impacts and corrective measures would be taken.

6. Data for all stream areas for habitat conditions, number of coldwater/warmwater game/nongame fishes, endangered, threatened, and sensitive species, and the potentials for habitats and fisheries improvements and management are not available. The ES contains the available data that were relevent for assessing impacts to the fisheries resource.

7. The Colorado River cutthroat trout does not occur in the ES area. Refer to USDA Forest Service General Technical Report RM-28, August 1976. The Utah cutthroat occurs on Forest Service and private lands north of the Hot Desert ES area of concern (see also response to letter 7-4).

8. Such information was requested from the Utah Division of Wildlife Resources but they were not able to supply it, nor would they give BLM permission to collect the data.

9. MFP recommendation and decision were to protect riparian and aquatic habitat. This is shown in table 1-11 Wildlife, B. Proposed management is consistent with MFP objectives.

10. Mitigation is part of the proposal. Refer to previous response, letter 7-4.

11. The Virgin River Management Framework Plan considered multiple use opportunities for aquatic and riparian habitats as well as other resources from which the proposed grazing management plan as presented in the ES evolved. The Hot Desert ES addresses aquatic-riparian habitats and fisheries.

12. The ES considered a wide range of alternatives. The proposed action includes a monitoring and mitigation plan to assure protection of the aquatic-riparian resource. The proposed action and alternatives assure that adequate management choices will be available to the District Manager during the decision-making process.

United States Department of the Interior

NATIONAL PARK SERVICE
UTAH STATE OFFICE
125 S. STATE STREET
SALT LAKE CITY, UTAH 84138

14

IN REPLY REFER TO:
L76

July 18, 1978

Memorandum

To: District Manager, Cedar City District, Bureau of Land Management

From: Assistant to the Regional Director, Utah

Subject: DES - Hot Desert Grazing Management

We have reviewed the subject DES and are favorably impressed with the depth of analysis of the impacts anticipated from the implementation of any of the alternatives considered.

1 One area that has not been explored, and pertains, we think, to the subject of the effects of the current level of grazing in the area on the existing environment, is the availability of disturbed soil particles to wind erosion. The effect of wind-borne soil particles on visibility, particularly in Zion National Park, is a matter of concern. Concentrations of soil particles can contribute to exceedance of National Ambient Air Quality Standards for particulates as well.

James L. Isenogle

cc:
Regional Director, Rocky Mtn Region
Supt., Zion NP

RESPONSE: National Park Service, Salt Lake City, Utah

1. The present air quality monitoring of atmospheric pollutants southeast of St. George reveals generally very clean air. The proposed action which is designed to increase perennial vegetative cover is expected to reduce the level of wind-borne particles.

UTAH AUDUBON SOCIETY

SALT LAKE CITY, UTAH

UTAH STATE OFFICE

15

July 17, 1978

Maureen E. Ellis
Department of Psychology
University of Utah
Salt Lake City, Utah 84112

TO: Director, Utah State Offices, Bureau of Land management, Department of Interior

Concerning the proposed Hot Desert Grazing Management Plan, we suggest that the BLM consider further alternatives which favor environmentally sound multiple-use rather than just the apparent single-use concept, i.e. livestock grazing. Any realistic interpretation of the BLM grazing plan as it now stands reveals that only continued resource deterioration of an already compromised area will occur. We further suggest that livestock grazing may not deserve such a high prioity in this long man-damaged region.

A suitable alternative management plan should include the following considerations:

1 (1) The riparian habitat should have much better protection with probable fenced buffer zones to exclude livestock in order to prevent further erosion, sedimentation, and coliform contamination of this valuable watershed.

2 (2) Streambank stability, vegetative shading, spring and seep protection, and general water quality monitoring are necessary to insure the continued survival and recovery of endangered and sensitive native and game fishes such as the woundfish, roundtail chub, spinedace, and particularly the Utah cutthroat.

3 (3) Streambank vegetation and trees are crucial to various bird species-----orioles, warblers, thrushes, finches, flycatchers, raptors and other birds of prey, herons, egrets, waterfowl, etc.-----for nesting, feeding, protection, and migration. A four-seasonal bird population evaluation should be part of any BLM grazing plan.

4 (4) The entire proposed grazing area should be considered as important deer forage habitat rather than just those areas inaccessible to livestock. Why is an antelope fence being planned in an area devoid of pronghorns? Such fences may be obstructive, injurious, or even lethal to mule deer.

5 (5) The declining desert tortoise population must be given primary consideration. Year-after-year grazing may not be compatible with the survival of this historically important native, especially in the Beaver Dam Slope area.

6 (6) Certain mollusks which may be threatened or endangered have not been discussed in your plan (such as the St. George snail). A complete ecological-impact statement must include all known species.

Generally, we propose that native flora, fauna, and watershed resources have an equal or higher priority in subsequent BLM grazing management plans than your present Hot Desert Grazing Plan has allowed.

Thank you.

Maureen E. Ellis

Member, Board of Directors
Chairperson, Wilderness Committee
for the Utah Audubon Society

cc: Audubon Society
Wilderness Society

RESPONSE: Utah Audubon Society, Salt Lake City, Utah

1. The riparian habitat would be monitored and evaluated to assure management's objectives are being attained. If the studies indicate a need, changes would be made to prevent further deterioration of the resource. If objectives are not being achieved, other alternatives such as fencing to control livestock would be considered. See Chapter 1, Monitoring Programs, and Chapter 4, Water Resources and Fisheries.

2. Water quality monitoring is now being carried out as indicated in Chapter 4, Water Resources and Fisheries. The monitoring and evaluation program now implemented in the Hot Desert is designed to evaluate the effects of the proposed action on the fisheries and riparian habitat on public land. This includes, but is not limited to vegetative studies, water quality studies, fisheries population census, and macroinvertebrate and stream bed evaluations. The Utah cutthroat does not inhabit the area covered by this ES.

3. The monitoring and evaluation of riparian habitat is designed to measure change in condition of the vegetation in riparian zones. Response 17-20 explains the riparian condition standards that would be used to judge effects of the proposed action on riparian habitat and the resultant condition. Tall, woody vegetation and other cover which shades streams would also benefit birds.

4. The deer distribution map, figure 2-14 in the back of the statement, shows the location of deer in resident herds, normal winter range, and critical winter range. These areas are not solely in areas inaccessible to livestock. The entire area shown on the map was considered deer habitat. The sentence in Chapter 2, Vegetation, that led to a misunderstanding has been deleted. Fence diagram in Chapter 1, figure 1-9, has been modified to show a deer fence design.

5. The Beaver Dam Slope area is not proposed for "year-after-year" grazing. It is proposed for a 3-pasture rest-rotation system as described in Chapter 1, Proposed Action section. Addtionally, Alternative 7 is available for the manager to use if monitoring and evaluation of the Beaver Dam Slope indicate a need to protect the tortoise further.

6. The text has been changed. The two snails found in the Hot Desert region proposed for Federal listing as threatened and endangered are discussed in Chapter 2, Wildlife.

16

THE DESERT TORTOISE COUNCIL

1835 Klauber Ave.
San Diego, CA 92114
July 18, 1978

District Manager
Cedar City District Office
Bureau of Land Management
P.O. Box 729
Cedar City, UT 84720

Ladies and Gentlemen:

We are responding to your request for public comment on the draft Environmental Statement for Hot Desert Grazing Management.

We are disappointed with many aspects of the draft Environmental Statement and proposed action. There is not one alternative set forth that will adequately protect the Utah desert tortoise populations. Alternative 7, which we support only because of lack of a better one, has several deficiencies and inconsistencies. These and other problems are outlined below.

Alternative 7. Alternative 7 provides for 5120 acres or 8 square miles of habitat to be fenced to exclude livestock grazing and to protect the desert tortoise on the Beaver Dam Slopes. The remaining acreage is apparently to be grazed from December through May of each year on a three pasture system.

1 It is unclear how the Woodbury Desert Study Area fits into this proposal. We were of the impression that this study area was going to be fenced, yet there is no indication of a fence on any of the figures showing livestock improvements (Figs. 1-2, 2-1, 2-2, 2-23, and 8-3). There is no mention of a fence in Table 1-11, pp. 1-54 and 1-55, yet there is the statement that the area west of the highway will be managed for the tortoise. How much area will be protected for the Woodbury Desert Study area, the 2840 acres noted on page 1-54 or the entire area west of the highway (Table 1-11)? What area will be fenced to exclude grazing? When will it be fenced? What is happening with the MFP commitments?

2 There is a problem with description of tortoise "concentration" areas. The areas shown in Figures 2-15 and 8-3 are also inconsistent with each other. Perhaps the inconsistencies are an artifact of the small maps; however they should be corrected.

3 We would like to know which "concentration" areas shown on Coombs' 1977 map will be included in the 8 square mile fenced area. We don't see how more than a few can be included in such a small area. How many of the 350 native tortoises are estimated to occur in the 8 square miles? How many marked tortoises are here? How many tortoises are adult females?

THE DESERT TORTOISE COUNCIL

4 Bureau of Land Management's Policy on Threatened, Endangered, and Sensitive Species. Bureau Manual 6840 provides direction for management of certain species not yet listed on federal or state lists under a "sensitive" species category. The desert tortoise has been proposed for listing on the federal endangered species list and although the proposal has not yet been placed in the Federal Register, such action is likely to occur within the coming months. The desert tortoise certainly qualifies as a BLM "sensitive" species. Is the desert tortoise on the Utah BLM's "sensitive" species list? Has a study been made of its "crucial" habitat? According to 6840.3, Consideration of Sensitive Wildlife Species, the "fundamental objective is to maintain or increase current population levels of sensitive animals through early habitat protection or enhancement. In such cases, effective and aggressive programs will help to minimize the chance of official listing..."

5 We do not think that the desert tortoise has been given the consideration necessary to provide for the continued existence, maintenance, and improvement of the native population in Washington County. On pages 3-48 and 3-49 statements are made that there will be competition for forage between tortoises and livestock during the year of spring grazing. Additional statements describe the impact and the deleterious effect of livestock grazing on tortoise habitat and behavior. Table 3-13 shows that the type of grazing proposed would cause an increase in perennial cover and a decrease in annuals, important forage for the desert tortoise. The increase in perennial grasses would be slower than typical and might not occur soon enough to be of benefit to the tortoise. A decline in critical habitat areas of tortoise and livestock areas is predicted. In spite of these statements and predictions, little mitigation is proposed. The two populations proposed for protection (Woodbury Study Area and the 8 mile enclosure) would eventually be separated from one another and from the Arizona population through habitat deterioration and population decline outside the enclosures. Even if surrounding habitat on the Indian Spring, Castle Cliffs and Beaver Dam Slope allotments gradually improves over a period of 20 to 30 years, it will take too long to help a tortoise population that is already in serious condition. It is possible that the fenced areas will contain very small populations of tortoises too limited in numbers to survive.

6 Chapter 4. The mitigation measure described on page 4-9 is too vague and generalized to help the desert tortoise. What is the schedule for setting utilization limits on cattle grazing? Will this be done every spring? When will the mitigation measure be implemented? When will the study be initiated to determine requirements of the desert tortoise for forage? It would seem that grazing should be withheld from the Beaver Dam Slopes until some of these studies could be implemented and the questions about desert tortoise forage requirements answered.

THE
DESERT TORTOISE COUNCIL

(7) Chapter 5. The last paragraph on page 5-7 is confusing. Are you proposing to "decline the 5,120 acres" in the enclosure for tortoise habitat?

(8) Chapter 6. The desert tortoise is not mentioned under Wildlife in the long term-short discussion of impacts, yet in Chapter 3 there is mention of a potential long term decline in population due to the type of grazing system proposed (see Table 3-13). The effects of the proposed grazing system on the desert tortoise should be documented here in Chapter 6.

(9) Chapter 7. Again, the desert tortoise should be mentioned here under irreversible and irretrievable commitment of resources. The proposed action will cause a decline in tortoise populations, or at the very least, contribute to further declines. This should be noted on page 7-4. Certain wildlife populations don't fit the category of "renewable resources", especially when the habitat has deteriorated and may not recover for decades, even centuries.

Other Problems and Comments.

(10) 1. The draft Environmental Statement states that there are 400 to 500 desert tortoises on the Beaver Dam Slopes. According to Coombs (1977), there are an estimated 350 native tortoises on the Slope and 68 captives. The distinction between wild and captive tortoise numbers should be made.

(11) 2. On pages 2-57 and 2-58 there are references to statements by Dr. Berry (1976). The reference is: Berry, K.H. 1976. A comparison of size classes and sex ratios in four populations of the desert tortoise. In Proceedings of the 1976 Symposium of the Desert Tortoise Council, pp. 38-50. Held in Las Vegas, Nevada.

(12) 3. On page 2-57 the statement is made that the "tortoise is a polygamous species and it's population should have more females than males." There is no evidence to date that tortoise populations should have more females than males and that the sex ratio is related to the sexual system. In a study of 18 tortoise populations in California, the sex ratio was found to be close to 1:1 in relatively undisturbed populations.

(13) 4. The statement is made that objectives of the Bureau's Planning System MFP and AMP for long-term sustained productivity of livestock forage and improvement of watershed and wildlife resources are estimated to be reached 24 years after implementation (for the Beaver Dam Slopes). There is the implication that the vegetation will recover from overgrazing within that time period (reach 100% of its potential). What is the documentated evidence that vegetation recovery from overgrazing can occur in 24 years? Won't recovery take much longer?

THE
DESERT TORTOISE COUNCIL

(14) 5. There are some confusing statements on AUMs. Table 2-15 for Existing Livestock Management notes that there are currently 1132 cattle in the area. We estimate that they use 7435 AUMs (using the number of months shown in the table for each of the allotments). The AUMs in Table 1-10 under Normal Operation are listed as 2490. The decline in AUMs that is proposed in the same table appears to be referring to the 200 AUM decrease for the 8 square mile enclosure. How many AUMs are currently in use on the Beaver Dam Slopes (including Indian Spring, Castle Cliffs, Beaver Dam Slope and Santa Clara)? What is the percentage of proposed decrease in AUMs for the Beaver Dam Slopes? What percentage of that decline is due to the 8 square mile enclosure and to the Woodbury Study Area?

(15) 6. We are concerned about the proposed deterioration of riparian habitat. Riparian habitats are some of the most imporatnt in the nation.

(16) 7. We are concerned that there is no treatment of all vertebrate species by habitat type. The emphasis on vertebrates in this report is on game species and on the desert tortoise.

We very much want to have the above questions answered and look forward to hearing from you.

Sincerely yours,

Glenn Stewart Don Seibert

Glenn Stewart
Co-Chairman

Don Seibert
Co-Chairman

cc: Office of
Endangered Species

<u>RESPONSE</u>: Desert Tortoise Council

1. The Woodbury Desert Study Area is not part of the proposed action. It is an MFP decision. The MFP decision states that the area east of the highway will be managed as the Desert Study Area, not the west side. A total of 2,840 acres would be excluded from grazing as the Desert Study Area. This area would be fenced.

   Under Alternative 7, however, 5,120 acres could be fenced to exclude livestock on the west side of the highway (fig. 8-3). The Beaver Dam Slope Allotment would be grazed under a three-pasture rest rotation system (see table 1-2 for general description of system). However, the grazing period for the Beaver Dam Pasture would not extend beyond April 30. Also, see tables 1-10 and 1-11. Fencing of the Woodbury Desert Study area would occur as soon as funding is made available.

2. It is difficult to outline specific areas on such small scale maps. For a more detailed map of concentration areas, see Coombs (1977).

3. The concentration areas proposed to be fenced in Alternative 7 include the five southern areas west of the highway on Coombs' map (1977). It is unknown how many tortoises would occur within the exclosure proposed in Alternative 7, nor how many marked or female tortoises but it is the largest concentration of tortoises on the west side of the highway.

4. The desert tortoise has been listed as a "sensitive" species by the Division of Wildlife Resources and concurred in by Bureau of Land Management in Utah. Crucial habitat studies have not been made to date, but these studies will be an integral part of the BLM wildlife habitat management program.

5. Under the proposed action, the AMP considers the tortoise needs and if these needs are not being met, the manager has the prerogative to make livestock adjustments.

6. This is explained in table 1-11, Wildlife J under heading Management Goals and Objectives. This management action, restricting livestock from the tortoise area after March 15 before the AMP is implemented, is in effect. It is not proposed to study the specific requirements of the desert tortoise at this time.

7. The ES states "The decline on 5,120 acres of tortoise habitat outside the Woodbury Desert Study area . . . would continue".

8. The text has been changed. The wildlife section of Chapter 6 has been modified by adding subject information.

9. The desert tortoise is presently considered a monotypic species and the Beaver Dam Slope population is not taxonomically distinct, therefore, there is no apparent reason to assume the population is not renewable.

10. The text has been changed in Wildlife sections Chapters 2, 3, and 5 to indicate a total of 350 mature tortoises.

11. The text has been changed to Berry, 1976. Reference has been included verbatim.

12. The text has been changed (Wildlife section, Chapter 2) to remove the statement " . . . and its population should have more females than males".

13. The 24 years was used as a time limit for comparative analyses. Some allotments would attain potential within that time frame; other allotments may not reach potential.

14. There are not 1,132 cattle running the entire number of months shown. Many are double counted. The AUM figure is in the column Base Property Qualifications (AUMs) and total 3,311 AUMs. The Proposed Action Summary, table 1-10, normal operation, is to stock at a level of 2,490 AUMs, a reduction of 821 AUMs or 25 percent. The decline in AUMs that is proposed in the same table does not refer to the 200-AUM decrease for the 8-square-mile enclosure. The 8-square-mile enclosure is not part of the proposed action and is analyzed in Alternative 7 of Chapter 8 only.

    There are 3,311 AUMs currently authorized on the Beaver Dam Slope as is shown in Appendix I, XIX, and table 2-15 under the heading Base Property Qualifications.

    The Woodbury Desert Study Area of 2,840 acres would reduce the forage for livestock by 60 AUMs. This is shown in table 1-11, Wildlife, J, under the heading Restraints on Grazing. This reduction was made before the proposed action and is included in the total reduction of 821 AUMs.

15. A monitoring and evaluation program has been developed to assure management's goals are being met. Chapter 1, Monitoring Programs, and Chapter 4, Water Resources and Fisheries, explain how the riparian and fisheries habitat would be monitored.

16. Analysis of impacts revealed little or no change to the habitats of other vertebrate species except where they are specifically mentioned in the text, such as in Chapters 2 and 3, Wildlife under Big Horn Sheep, Other Mammals, Game Birds, Mourning Doves, Waterfowl, Nongame Birds and Raptors, and Reptiles. The threatened and endangered Peregrine Falcon is covered specifically as well.

17

Scott M. Matheson
Governor

Kent Briggs
State Planning Coordinator

STATE OF UTAH
Office of the
STATE PLANNING COORDINATOR
118 State Capitol
Salt Lake City, Utah 84114
(801) 533-5246

July 19, 1978

Morgan Jensen
1579 North Main Street
P.O. Box 729
Cedar City, Utah 84720

Dear Mr. Jensen:

The Utah State Environmental Coordinating Committee has reviewed the Hot Desert Grazing Environmental Statement and offers the following general comments.

1) Portions of the document are difficult to understand and interpret as it covers the impacts of a grazing allotment management plan. The allocation of other resource uses are not adequately considered.

(1) 2) The section on mitigating measures seems weak and should be strengthened by addressing relationships with other resources even though some mitigating measures are scattered throughout the statement.

3) Although the State holds ten percent of the lands within the area covered by the document, impacts on those lands are vitually ignored.

Specific comments from the Utah State Department of Agriculture, the Utah Division of State Lands and the Utah Division of Wildlife Resources are included for your information.

Thank you for this opportunity to comment.

Sincerely,

Kent Briggs

Kent Briggs
State Planning Coordinator

KB/jl

Enclosures

cc: Paul Howard

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state of utah

DIVISION OF WILDLIFE RESOURCES

DONALD A. SMITH
Director

1596 West North Temple/Salt Lake City, Utah 84116/801-533-9333

July 17, 1978

Mr. Milo Barney, Chairman
Environmental Coordinating Committee
Department of Natural Resources
State Capitol Building
Salt Lake City, Utah 84114

Dear Milo:

We have closely reviewed the Draft Hot Desert Grazing Management Environmental Statement and feel there is much room for improvement. Portions of the document are difficult to understand, it is difficult to interpret most data therein and it is slanted heavily toward livestock grazing to the detriment of all other resources in the area. Even with proposed mitigation we feel adverse impacts to other resources are too high and unacceptable. We do find, however, that the statement follows our recommendations as submitted concerning deer numbers and stressing the importance of specific allotments for deer.

Following are our specific comments:

(2) On page iii, 2. Brief Description of Action, (3) of the objectives of the proposed action is to enhance wildlife habitat, including that for deer, desert tortoise and quail. To help accomplish this water developments should all include (a) ground water remaining at source when springs are developed; (b) ground water along pipelines at appropriate intervals; and (c) fencing of ground water areas to prevent trampling. Overall impacts evaluation shows declines in quail habitat on 48,409 acres and improvements on only 33,818 acres. Spring grazing will impact quail areas especially in dry years yet the report states quail numbers are not expected to change (reference page 3-46). Also number (3) on line 6 is too specific. Wildlife types should be given instead of only three species.

(3) On page iii, #2, second paragraph, range development should also list any burns, spraying and chaining.

(4) On page iii, #3, second paragraph, no mention is made of reduced riparian habitat or sacrifice areas on new water as adverse impacts.

(5) In Chapter 1, Description of Proposed Action, the entire chapter seems to be offered as an experiment as well as a site-specific management plan. We wonder if the initial experimental design has been statistically designed to produce valid analyses and comparisons. The various types of treatments and planned future evaluations of actual project impacts should be described. They were discussed, but the evaluation methods are referenced only as the "BLM

Mr. Milo Barney
July 17, 1978
Page 2

Manual". To permit peer appraisal and constructive criticisms and advice necessary for design improvement, there should be substantial description of impact analysis and comparison methodologies.

6 Page 1-3, next to last line, should include cover, water, forage, etc. for wildlife on a sustained yield basis.

7 On page 1-13, #2, riparian areas should be listed as an example of resource problems.

8 On page 1-13, #(4) next to last line, is on systems involving season-long use primarily in winter months. This will not maintain present conditions or improve habitat thus is inconsistent with #3 above to enhance the resource unless cattle A.U.M.'s are reduced. 9 On the same page under #6, second paragraph we feel the BLM method of determining condition and trend index to plant condition and ground cover is inaccurate and, therefore, unreliable.

10 On pages 1-14 to 1-21 we feel livestock grazing on big game winter ranges during the period from July 1 through March 31 would be detrimental to wintering deer because livestock would be removing forage in direct competition with deer, thus eliminating forage deer are completely dependent upon.

11 Page 1-15, Third Treatment would allow rest period for at least one full year. The Livestock Grazing and Water Quality Protection draft report (May 26, 1978), prepared by EPA and BLM, maintains that rangeland with good (70%) plant cover generally requires 3-13 years of nonuse to completely restore infiltration rate and capacity. Surface runoff is directly dependent on infiltration, as most deleterious water quality effects due to grazing are incident to runoff. Therefore, since the rangeland in the subject area is at best less than 70% plant cover, it should be stated in text that potential rest periods may be up to several or more years assuming naturally poor rangeland requires rest periods longer than better lands.

12 On page 1-21, Table 1, season-long cattle grazing from January 1 to March 1, if done continually, will be very detrimental to early maturing desert plants, especially perennial plants.

13 On page 1-23, Design Restrictions, consideration by restriction must be given to critical wildlife habitats and concentration areas as well as for endangered species when range developments are constructed or planned.

On page 1-24, Figure 1-4, the map shows an area scheduled for chaining and seeding. We believe chaining is not feasible in desert areas but burning and seeding is more acceptable. Burning is not discussed as a range improvement tool.

14 On page 1-27, No. 6, if wetlands around a spring cannot be maintained, the spring should not be developed.

On page 1-27, Pipelines, second paragraph, surface rock area where the pipe must be on the surface, should be avoided.

Mr. Milo Barney
July 17, 1978
Page 3

15 On page 1-29, Rainfall Catchments, the design for the drinking facility should be done to prevent wildlife mortality, especially of young animals. Also under "Water Troughs", round tanks would be particularly hazardous to young birds that fall in because escape would be virtually impossible. On page 1-30, No. 6 ramps should be provided at both ends of troughs to provide escape and access of wildlife, especially young animals.

16 On page 1-30, Reservoirs, rehabilitation of banks and disturbed areas should utilize shrubby species of plants for wildlife cover.

17 On page 1-34, No. 4, the word "high" in "high big game use" should be deleted and fences should not be higher than 42 inches.

One page 1-36, Seeding (chaining), no mention is made of vegetative types that will be chained nor are any wildlife benefits mentioned. Also, surveys should be made to determine wildlife which will be destroyed or badly affected. The planting of seedling browse and desirable shrubs may also be necessary to establish these species on chained areas.

18 On page 1-46, Related Actions, the Utah Division of Wildlife Resources should be contacted to see if wildlife needs are being met.

19 On page 2-28, Riparian Vegetation, the second paragraph should list cottonwood trees as an important species classed as typical riparian vegetation.

20 On pages 2-28, 2-31, 2-61, (Table 2-10), 2-66 and 2-67 there are references in text and table to "poor, fair, good, and excellent" riparian habitat, but there is no clue as to quantitative or qualitative distinctions among the U4 classes. For example, even under an equivalent percentage of bank cover, there is considerable difference in riparian habitat quality when comparing short-grass cover and willow or long-sedge cover. Overhanging vegetation is, as a general rule, much more valuable than short, non-overhang vegetation as fish habitat cover. Furthermore, phreatophyte riparian vegetation may be strongly deleterious to aquatic wildlife if it is abundant enough to deplete streamflow. There should be a descriptive (quantitative and qualitative) differentiation of riparian habitat classes, but it probably would not need to be species-specific. There is a general discussion of the value of good riparian cover on page 2-66 and 2-67.

21 On page 2-31, first paragraph, Figure 2-6 is referenced but its location in the Appendix is not. Also, the riparian area in Beaver Dam Wash, as shown in Figure 2-6, does not extend far enough south.

22 On page 2-31, second paragraph, riparian areas in poor condition should be identified and no mention is made of important wet meadows, springs, etc. that will be impacted.

23 On page 2-32, second paragraph, our calculations on condition of public lands are as follows: Excellent - 1.4%; Good - 10%; Fair - 28.5%; and Poor - 60%. Riparian areas should be classed separately.

24 On page 2-44, Wildlife, third paragraph, all wildlife impacts should be considered because grazing, chaining, etc. will affect the habitat for all wildlife species.

25 On page 2-44, BLM indicates that they have run utilization transects to estimate deer use in specific areas. Why was this necessary in light of the fact that there is an abundance of browse on these units? Secondly, in Appendix XIII, they give a breakdown on data on these transects. The utilization on specific plants appears to be extremely high in this area. We have one browse transect on Unit #58 where utilization over the past years has been as low as 32% and as high as 40%. These transects are run by inter-agency personnel involving the Forest Service, BLM, and DWR. There appears to be quite a discrepancy in the results of the Interagency transects and the BLM transects. We do not feel that utilization is this high, especially on the west side of Washington County. The figures are misleading concerning deer use.

26 On page 2-48, first paragraph, Beaver Dam Creek and Ash Creek should be added as riparian areas important to quail.

27 On page 2-49, Nongame Birds and Raptors, much more attention should be given raptors such as important cliff zones, hunting areas, prey species and the effects on these of the proposed program.

28 On page 2-56, second paragraph and page 3-49, third paragraph, the number of tortoises on the Beaver Dam Slope area is 350 according to Coombs, 1977.

29 In the Wildlife section there is no mention of important wildlife as per Hot Desert Contract, Coombs, 1977 such as Desert Iguana, Chuckwalla, Gila Monster etc. and they should be discussed. Also, no mention of wildlife for which the E.S. area is the extreme north or south limits of their habitat. They are unique and should be discussed.

30 On page 2-60, 2-61, 2-62 Water Resources and Fisheries, although Ash Creek is mentioned (p.2-60) as one of the four major water sources in the subject area, it is neither mentioned nor addressed in Table 2-10 (p.2-60, 2-61) or anywhere else in text as Class III brown trout fishery. It is entered on private land within the subject area, has fair riparian vegetation, and good self-sustaining trout population potential. Total stream length is 5 miles.

31 On page 2-64, Water Quality, water discussion is limited to total dissolved solids and sediments, whereas other major unaddressed parameters are: nitrogen, phosphorus, organic compounds, BOD, and fecal coliform bacteria. Surely some baseline data on these parameters exists either from the State Division of Health, County Departments, or at least the Winget, Baumann, and Deacon 1977 report on the Warner Valley Project. There is no site-specific data presented on TDS or sediments presented, so impact analysis suffers from a comparative standpoint. The only water quality quantification is "100-6000 ppm TDS and 1.2-1.8 acre-feet of sediment per square mile" in the subject area.

32 On page 2-65, Fisheries, it is stated that native fishes in the ES area are adapted to widely fluctuating environmental conditions caused by extreme variation in stream discharge and stream sediment loads. It is apparently true that woundfin, Virgin River spinedace and Virgin River roundtail chub have survived prior severe environmental stress, but their adaptive attributes are not known. Even these species may not be well adapted, but merely tolerant (marginally adapted) of conditions imposed to date. It is not yet known if they can survive some additional increments of perturbation, but it would not be acceptable to permit new, unusual disturbance to test their adaptive ability. Species extinction is the potential cost of such an action. Other native species exist in waters where environmental conditions and extremes are further moderated, and do not show particularly significant adaptations to environmental stress, fluctuations, or harshness.

33 On pages 2-67, 2-68, Endangered and Potentially Sensitive Species, there is presented only a very cursory description of woundfin ecology, based on Warner Valley Water Development Project EIS (Winget, Baumann, and Deacon 1977). There is now at least a fair amount known about ecology (food habits, habitat preferences, etc.) of woundfin, particularly adults. Relationships between woundfin, substrate, and macroinvertebrates have been reported to at least a limited extent, although this information is neither detailed or even acknowledged in this ES. The report should mention that woundfin benefit substantially from good riparian cover.

34 On page 2-68 Fisheries Habitat, the Utah cutthroat is incorrectly listed in text as unprotected. It is protected by UDWR code, although it is not on a federal list. It is of very restricted distribution in Utah and is subject to recovery effort on other BLM land, notably the Deep Creek Mountains. It is not, as mentioned in the text, known to inhabit the subject area.

35 On page 2-69, Table 2-12, there is considerable misspelling of fish species scientific names (8 errors noted in table.)

36 Page 3-18, last line states "erosion won't stop but will be slowed." This can be stopped by reduction of grazing and protection of all riparian areas, wet meadows, springs and errosive areas.

37 On page 3-44, Wildlife, numbers of allotments are given where habitat conditions would decline. The decline for wildlife is unacceptable and can be reduced by less grazing which will benefit all resources present.

38 On pages 3-50 to 3-59 and 4-1 to 4-7 a comparison of wildlife losses in Table 3-13 and Table 4-1 shows that there will be a habitat decline on 49,483 acres of deer habitat as a result of the proposed grazing plan. Proposed full mitigating measures of reseeding, cattle rotation, use evaluation, fencing and cattle control would be applied to 27,678 acres, leaving a net decline of 21,805 acres of deer habitat.

There will be a habitat decline on 73,148 acres of quail habitat as a result of the proposed grazing plan. Proposed full mitigating measures of reseeding,

(39) use evaluation, fencing and livestock control would be applied to 40,845 acres, and partial mitigating measures of use evaluation, fencing and restriction of livestock would be applied to 13,378 acres, leaving a net decline of more than 25,614 acres of quail habitat.

(40) There will be a habitat decline on 5,120 acres of tortoise habitat as a result of the proposed grazing plan. Partial mitigating measures of vegetaion production and cattle utilization studies would not minimize impact. Cattle competition would result in a net decline of something less than 5,120 acres of tortoise habitat.

(41) We can only assume from the summary of impacts that wildlife resources are being deliberately sacrificed to overgrazing by domestic livestock and will thus be detrimentally affected. The proposed grazing plan should include reduction or elimination of livestock grazing in the following allotments showing wildlife habitat decline and partial or no mitigating measures. The Utah Division of Wildlife Resources will not concur with the Draft Hot Desert Grazing Management Environmental Statement unless these (and other) changes are incorporated into the plan.

EXTRACTS FROM: TABLE 3-13 and TABLE 4-1

	Acres Habitat Decline			Mitigating Measures
Allotment	Deer	Quail	Tortoise	
Apex Slope				
Winter Pastures	1,000	2,986	None	None
Spring Pastures	1,000	2,893	None	None
Beaver Dam Slope	NC	NC	5,120	Study use - only minimized
Boomer Hill	1,428	IMP.	None	None
Bull Mountain	NC	804	None	Study use, fence and restrict livestock-only minimized
Coolpits	2,525	NC	None	None
Curly Hollow (Holding Pasture)	1,410	1,410	----	None
Daggett Flat	4,127	NC	None	Rotate cattle - fully mitigated
Desert Inn	NC	12,574	None	Study use, fence and restrict livestock-only minimized
Fort Pierce	NC	108	None	Study use, control livestock-minimized

	Acres Habitat Decline			Mitigating Measures
Allotment	Deer	Quail	Tortoise	
Gunlock	6,334	6,334	None	None
Jackson Wash	19,216	28,680	None	Reseeding - fully mitigated
Land Hill	105	NC	None	None
Red Cliffs	NC	12,165	None	Study use, control livestock - fully mitigated
Santa Clara Creek	304	NC	None	None
Smith Mesa	2,940	NC	None	None
Virgin	NC	1,413	None	None
Black Canyon	600	NC	None	None
Dalton Wash	855	NC	None	None
Herd House	NC	480	None	None
Hurricane	NC	160	None	None
Hurricane Mesa	350	NC	None	None
Lamoreaux	160	NC	None	None
Mesa	940	NC	None	None
North Grafton	500	NC	None	None
Red Butte	894	NC	None	None
Rock Spring	820	NC	None	None
Sand Hills	NC	992	None	None
Sand Wash Res.	640	640	None	None
Snow-Holding Pasture	3,495	NC	None	Reseeding -fully mitigated
Virgin	840	NC	None	Study use, fence, control domestic livestock - fully mitigated

	Acres Habitat Decline			Mitigating Measures
Allotment	Deer	Quail	Tortoise	
White Dome	NC	984	None	None
Yellow Knolls	NC	525	None	None
	49,483	73,148	5,120	

42 On page 3-51 under "Impacts" on Beaver Dam Slope, in the long term the habitat is critical and will decline. This indicates to us that grazing should be eliminated until the area is no longer critical or declining.

43 On page 3-61, Fisheries Introduction, the text reports that inadequate data precludes definitive impact analysis. However, for trout streams, enough habitat knowledge exists in the literature (especially recently) to make quite an evaluation of effects of streamflow changes on depth, velocity, and other hydrologic parameters, effects of sedimentation and BOD on egg incubation and fry survival, effects of flow-related hydrologic changes on habitat for all or most life stages of trout. Even some woundfin habitat preference data is available. Effects of TDS on Virgin River fishes is discussed in Warner Warner Valley Water Development Project EIS. The ES lists in Reference Cited reports (Wesche 1973, 1974) detailing trout habitat requirements and impacts of changed streamflow. There should at least be a basis for better qualitative assessment of project impacts.

44 No mention is made of effects of fencing on riparian habitat, although over-grazing, and even normal grazing effects on riparian zone are discussed. Fencing is mentioned as a possible mitigative measure after impacts are actually observed.

45 Overall, the impact analysis on aquatic wildlife habitat and populations is inadequate and poorly researched. Although few specific grazing studies addressing riparian habitat and aquatic wildlife exist, there is quite a base of knowledge on effects of bank cover removal, bank sloughing, sedimentation, BOD, etc. on aquatic wildife, whatever the cause of the parameter changes. These could be somewhat extrapolated and better discussed qualitatively, if not quantitatively.

46 On page 4-9, last paragraph, it does not specify what kind of study will be used to monitor condition and trend of riparian vegetation. We suggest a DWR biologist be a member of this evaluating team.

47 In Chapter V, Any Adverse Impacts Which Cannot be Avoided Should the Proposal be Implemented, the insufficient mitigation evaluation plan (Chapter 4) has

precluded identification of unavoidable adverse impacts in water quality or aquatic habitat and/or wildlife.

48 On page 5-3, Table 5-1 shows a great amount of unavoidable long-term adverse impacts to wildlife. All of the adverse impacts to wildlife are avoidable merely by reduced livestock grazing resulting in proper consideration for wildlife resources.

49 On page 7-5, last paragraph, the statement made has not been shown to be true. Earlier in the EIS it states the BLM doesn't know what the impact would really be in time, magnitude and total effect. This conflicts with the statement on page 8-15, Fisheries, lines 8, 9, and 10.

50 On page 8-49, Alternative 7 - Reduction of Negative Impact on Selected Areas appears to be more desirable than the proposed action alone. It would reduce the adverse impact on wildlife in specific areas where needed but would accomplish the benefits of the proposed plan. We strongly urge the combination of the proposed plan and Alternative 7 be adopted.

51 On page X-2, third paragraph, we question the Proper Use Factor (PUF) as reliable because it is too basic and does not take into consideration the composition of vegetative types which will change PUF.

52 Appendix Figures 1-2 and 2-23 depict existing and proposed allotments in the subject area. However, neither map incorporates streams, lakes, county boundaries, or even towns that would aid orientation of the user and comparison with fold-out maps elsewhere in Appendix. It is extremely tedious and difficult to identify impacted waters on the allotment maps, even when viewed in conjunction with fold-out maps showing stream segments. Since each allotment has its own management plan (AMP), it is essential to evaluate probable impacts based on the individual plans as well as upstream AMP's.

We appreciate the opportunity to review and comment on this document and proposal. We trust our comments will receive full consideration.

Sincerely,

Homer D. Stapley

Homer D. Stapley
Field Programs Director

MEMORANDUM TO: Environmental Coordinating Committee

DATE: 18 July 1978

SUBJECT: Hot Desert Grazing Management Environmental Statement Draft

The Division of State Lands has reviewed the draft of the Hot Desert Grazing Management Statement and submits the following comments:

The land ownership within the boundaries of the Hot Desert Environmental Statement consists of 794,441 acres. Of this, approximately 10 percent, or 79,708 acres of land, is owned and administered by the Division of State Lands. The proposed action by the Bureau of Land Management (BLM) would combine the 84 existing grazing allotments into 59 allotments. Of these, 42 would have intensive grazing management systems (AMPs); 14 proposed for custodial management, and three allotments would eliminate livestock grazing.

The Hot Desert Grazing Management Environmental Statement Draft has proposed seven alternatives ranging from elimination of all livestock grazing to a high level of grazing management. The proposed action by the BLM lies somewhere between alternative 5 and 6, which would be an increased forage production (AUMs) through vegetation manipulation; but this would be delayed and spread over a 24 year period of time. The proposed AMPs would, however, be implemented over a five year period, although no schedule for construction has been determined at this time.

The Division of State Lands would support the program which would aid in increasing the livestock forage production (AUMs) on Utah's range lands, and feels that it is directly affected by any action taken by the BLM in this area, as approximately 10 percent of the land is State-owned.

Range developments have been scheduled along with a closely monitored process to determine their effectiveness. The BLM indicates 11 different types of range development which would be required for implementation in their proposal. These include water development, fencing and chaining and seeding. The Division of State Lands is concerned as most of the Hot Desert allotments contain some State-owned lands. These State sections are usually leased for grazing to an individual rancher for use in conjunction with his livestock operations on public lands. As stated in the Environmental Statement, there are no BLM range improvements proposed for these State lands.

53 The Division of State Lands is desirous of being informed prior to the time these development programs are implemented so that, where possible, there can be a joint effort in developing both the State and public lands. It is felt that there should be a close coordination with all State, county and other federal agencies to allow for the maximum development potential whenever possible.

Respectfully submitted,

Kurt M. Higgins

KURT M. HIGGINS
Land Specialist

KMH/sb

State of Utah
Department of Agriculture
Salt Lake City, Utah 84103

KENNETH B. CREER
COMMISSIONER

533-5421
AREA CODE 801

Milo
from Jim Harvey

RECEIVED
JUL 17 1978
Dept. of Natural Resources

MEMORANDUM

TO: Milo A. Barney DATE: July 14, 1978

FROM: Ben W. Lindsay

SUBJECT: Hot Desert Study

Dear Milo:

The Department of Agriculture appreciated the opportunity to be invited to a meeting relative to the Hot Desert study on July 7 at the BLM conference room. At the July 7 meeting other divisions of state government expressed the same feeling that we received in the Department of Agriculture from the Hot Desert Environmental Impact Statement report. Many facits of an environmental program were not included in the document. They had based their reasoning generally toward livestock which we did conclude as we studied the document. Robert Dusenbury of the BLM stated at the meeting, that it was the intent of the full report to be written toward livestock and not include all other features of the environment. With this thought in mind, the documents has an entirely different concept than we had before Dusenbury made his statement.

Definitions

Those of us that have studied the document in the Department of Agriculture agree with the statements that were made in that there was too much space taken in definitions and illustrations. A lot of those things can be referred to in BLM manuals and wouldn't have to be specified in that particular document.

Assumptions

The greatest criticism that we have toward the entire document was the assumptions that were made by the writers and those that were on the report committee that if things happened the way they assumed, things would turn out rosey. It is difficult to assume what is going to happen on a yearly basis. With their limited experience in the Hot Desert area we question their general assumptions. In many cases they suggest dogmatic changes that should take place with the assumptions that they received. In most cases we didn't get the feeling that their assumptions were based on facts, but they were based on the judgement of those working on the report.

Another complaint we had of the entire document was that if there was to be a bad impact on the range, it was caused by livestock. Now again - as I mentioned earlier this made more clarity as Bob Dusenbury made his statement that the whole document was directed toward livestock. The statement was made in the report that the capital value of the permits in that area would not change even if there was a reduction.

Permit Value

This to us is not correct because if stockmen have so much value on each permit and that is reduced by one-third, or any figure, it would reduce the overall value of the permit which is a capital investment to the livestock operator. As this kind of document gets into the hands of people who are not familiar with range permits and livestock grazing, a statement like this could be quite miss leading. Permits are definitely an investment and can not be reduced without reducing the capital value to the operator. We will appreciate your including this information in with other state comments you send to the Bureau of Land Management.

Best regards,

UTAH STATE DEPARTMENT OF AGRICULTURE

Ben

Ben W. Lindsay, Director
Agricultural Development
and Marketing

BWL/kr

RESPONSE: State of Utah, Office of the State Planning Coordinator

1. Responses to these comments are covered in detail in the responses to the subsequent State agency letters.

2. Page iii is a summary page and as such is limited to one page and is not intended to cover anything in specific detail. Chapter 1, Range Developments, includes the suggestions offered. Both a BLM Wildlife Biologist and the Division of Wildlife Resources will be consulted before any range developments that affect wildlife are constructed (page 1-46, State Actions), and at that time, their recommendations will be considered in the design.

   The impact on quail numbers was predicted from comparing proposed action to present situation and the future environment without the proposal. Specific species mentioned on the summary page are considered the important species in the area. Other species are included in the body of the statement.

3. The text has been revised to include chaining. The proposed action does not include either burning or spraying.

4. Text has been changed to include reduction in riparian habitat.

5. The actual project impacts are shown in Chapter 3 and Appendix XXIII. The BLM Manual is available for review at any BLM office. To facilitate the reader's understanding, design restrictions and a brief explanation of how each development would be carried out is included in Chapter 1.

6. The text has been changed in accordance with objectives listed in part 4100.0-2 Grazing Administration Regulation.

7. Many resource problems were identified in the preparation of AMPs. Overuse of riparian areas would also be another example.

8. See text Chapter 3 Wildlife, table 3-13. Negative impacts are shown where there is continuous winter use.

9. The BLM method is explained in Appendix X and has been in use for many years. Problems encountered in sampling are not dissimilar from problems encountered in other methods or systems.

10. See comment and response 17-8.

11. The study reference is not applicable because infiltration rates in the ES area are not as readily affected by compaction from livestock grazing. The soils of the ES area are generally more sandy and drier than those in the report.

12. See comment and response 17-8.

13. Wildlife were considered in the design restrictions as well as in the methods of installation by individual facility. These are all covered in Chapter 1, Range Developments. Also, see response 17-2.

14. The wet lands would be fenced as explained in No. 6 in order to protect them from trampling. Also, see response 17-2.

15. See response 7-14.

16. Shrubby species of plants would be considered in the rehabilitation of reservoir banks.

17. The text has been changed. See figure 1-9 for fence design.

    The analyses of impacts to soils, vegetation, and wildlife can be found in Chapter 3.

18. The text has been changed to indicate coordination would take place.

19. The text has been changed to include cottonwood trees.

20. The riparian condition class was based on the professional judgment of a qualified fisheries biologist who used the following Riparian Habitat Inventory Criteria developed by BLM:

    a. Excellent. Diversity and abundance of typical riparian plants (trees, shrubs, forbs, grasses, etc.) and animals (mammals, birds, amphibians, invertebrates, etc.) good. Good age distribution and reproduction evident. Soil mostly covered with vegetation, bank erosion generally lacking. Cover for animals abundant. Vegetation shades water most of the day.

    b. Good. Most groups of typically riparian plants (trees, shrubs, forbs, grasses, etc.) and animals (mammals, birds, amphibians, invertebrates, etc.) present at or near stream border, but numbers may be reduced. Age diversity fair, reproduction evident. Some bare soil areas noticeable, but erosion at low levels. Riparian animals somewhat reduced or typical species missing, due to cover loss. Vegetation shades water at least part of the day.

    c. Fair. Many of the typically riparian plants (trees, shrubs, forbs, grasses, etc.) and animals (mammals, birds, amphibians, invertebrates, etc.) rare or missing from stream border. Age diversity lacking, little sign of reproduction. Bare soil may be common. Animal populations greatly reduced from lack of cover, may only be transitory in the community. Vegetative shade on stream lacking or only during morning and evening hours.

    d. Poor. Typically riparian plants and animals scanty or lacking in both numbers and diversity. Little age variation, no sign of reproduction. Range plants (i.e., rabbitbrush, sagebrush, etc.) abundant down to water edge. Erosion of bare soil normally high, but may be reduced in monotypic grass communities which provide good ground cover but little diversity or animal cover. No shade on water from vegetation.

21. Text has been revised to indicate location of figure 2-6. Riparian vegetation as defined in this ES requires the presence of perennial water. The Beaver Dam Wash south of the riparian area shown on figure 2-6 flows intermittently.

22. Riparian areas in poor condition are shown in table 2-10, under the heading of Miles of Fisheries Habitat and Riparian Condition. The specific springs and water developments impacted by the proposed action or a part of the proposed action are shown in figures 1-2 and 2-23. These developments were not considered as riparian habitat. No wet meadows have been found on public land in the ES area.

23. Riparian areas are classed separately in table 2-10.

24. Impacts on all wildlife are discussed in Chapter 3.

25. See response 7-11.

26. The text has been changed to include the two areas.

27. Since cliff zones are inaccessible to livestock, they would not be impacted by the proposed action, and were not discussed. Impacts on prey species (i.e. small mammals) are discussed in Chapter 3.

28. The text has been changed to 350 animals.

29. These species are discussed in the reptile section Chapter 2, Wildlife and impacts to reptiles are mentioned in Other Wildlife, Chapter 3.

30. According to the aquatic habitat inventory done by BYU, 1976, Ash Creek is an intermittent stream on public land below the Ash Creek Reservoir. The good, self-sustaining trout population potential is above the Ash Creek Reservoir and not in the ES area. Anderson Ranch Springs would be the only major perennial source of water below the reservoir and they are developed to provide culinary and irrigation water for the towns of Toquerville and LaVerkin.

31. Some data on the water quality parameters suggested are available for the major streams in the area, i.e., Virgin River, Santa Clara River, Ash Creek and LaVerkin Creek. Reliable information on the other water sources is not available. The available data were not presented because they are not specific enough to serve as the basis for identifying livestock/water quality impacts. Nonlivestock pollution sources along the major streams will mask any livestock-generated impacts (Vaughn Hansen, 1977). The proposed special fisheries/riparian/aquatic study areas noted in Chapter 4 would provide the data for specifically identifying livestock water quality impacts. Present data shows less than 1 percent impact for all livestock. This is not expected to change with the proposal.

32. Fishery analysis is based on the best information to date including the information listed in the References Cited section.

33. Text has been revised to acknowledge additional data sources for the woundfin (i.e., further information on the woundfin can be found in the Vaughn Hansen Report prepared by Winget, Baumann, and Deacon, 1977).

    The benefits of good riparian habitat for fish (in general) are discussed under Fisheries Habitat in Chapter 2.

34. Text has been revised, and the statement deleted. The Utah cutthroat trout is mentioned as having been planted in the Santa Clara River in the 1800s. However, the discussion goes on to state that the fish is not presently found in the area and will not be considered in the text.

35. Text has been revised to correct the spelling.

36. Further reduction or removal of livestock would not stop erosion because of the many factors affecting soil erosion. These are discussed in Chapter 8, Alternative 1, Soils section.

37. The decline of wildlife habitat has been considered in Alternative 7, Chapter 8. However, this does not require further reduction of livestock numbers, only changes in season of use and rotating use.

38. Alternative 7 has been provided for the manager to consider protection of the wildlife habitat.

39. The quail numbers are not expected to change in the long term in spite of short-term decline of habitat. The conversion of annual to perennial vegetation during the short term will be compensated by increased vegetative cover in the long term.

40. See response to comment 17-37.

41. All of the allotments listed have either been proposed for full mitigation or alternatives have been offered in Alternative 7, Chapter 8, except for Bull Mountain, Curly Hollow (holding pasture) and Desert Inn. All three of these allotments would be monitored closely in the riparian areas to assure management objectives are being attained and to prevent further deterioration. Extensive coordination with the Regional office of DWR occurred during preparation of the grazing plan and the Draft ES. This was an attempt to insure that wildlife resources received adequate consideration in the environmental assessment. The DWR letter of January 12, 1977 indicated sufficient forage was being made available for the present and potential deer numbers. Other wildlife resource needs would generally be provided for in the long term as perennial vegetation improves.

42. Alternative 7 specifically considers the needs of the desert tortoise and other wildlife. The manager has the prerogative to implement this alternative.

43. The level and detail of impact assessment were severely limited by inadequate site specific fisheries data and by a lack of studies that relate impacts to fisheries resources from the various grazing systems proposed in the Hot Desert area. For this reason, the analysis was generalized and the the monitoring program (described in Chapter 4) was developed to obtain the necessary data upon which future management and adjustments could be based.

44. Fencing of riparian habitat would be expected to show marked improvement; therefore, sedimendation and water quality would be expected to improve. However, improvement of fisheries habitat would be limited to certain areas due to scouring from continued high-intensity storms, dewatering from irrigation, and sedimentary and chemical deposition from irrigation return flows.

45. As previously stated in Chapter 3 Fsheries, it is difficult to predict with any certainty what changes will take place under the proposed grazing systems.

46. The suggestion was adopted and DWR has been requested to become a party to the monitoring and study program.

47. Continuation of short-term impacts would occur until they were identified through monitoring, mitigating measures were implemented, and the mitigation became effective in reducing or eliminating the adverse impacts.

48. The adverse impacts to wildlife are covered in Alternative 7.

49. The statement referred to reflects the renewable nature of biological systems in conjunction with the BLM ability to suspend or modify the proposed action. Thus, implementing the proposed action would not result in irreversible impacts to water quality, or quality of fisheries, as actions could be taken to reverse possible adverse effects caused by the proposed action.

The sentence on page 8-15 reflects the anticipated impacts of grazing riparian areas every year. Data on these effects are available. The earlier reference relates to our lack of knowledge on the impacts to riparian vegetation where the riparian areas are grazed according to various proposed grazing systems.

50. No response.

51. The PUF does consider vegetative composition. This is one of the main uses of the PUF to assure the key forage species within the vegetative composition are not overutilized. An example would be the PUF for blackbrush. This is set at 10 percent for livestock and 15 percent for deer. Since Mormon tea is the key species present in many blackbrush communities, if more than 10 percent of the blackbrush is allowed for livestock utilization, the Mormon tea would be overutilized. By the time livestock have utilized Mormon tea properly, blackbrush has been grazed 10 percent. If 25 percent of blackbrush is allowed for livestock, the Mormon tea would be overutilized. This is explained in Appendix X.

52. The maps as presented satisfy most needs within the cost limitations.

RESPONSE: Division of State Lands

53. Coordination will be carried out prior to time of development. See Chapter 1, Interrelationships, State of Utah Programs.

D-BLM-J99005-Ut

18

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VIII
1860 LINCOLN STREET
DENVER, COLORADO 80203

JUL 18 1978

Ref: 8W-EE

Mr. Morgan Jensen, District Manager
Bureau of Land Management
P.O. Box 729
Cedar City, Utah 84770

Dear Mr. Jensen:

The Environmental Protection Agency has reviewed the Hot Desert Grazing Management Draft Environmental Impact Statement and offers the following integrated comments for your consideration.

1 The grazing management proposals for the Hot Desert lack the fundamental studies on water quality impacts as a result of grazing. The draft EIS claims that no studies are available to indicate the impacts of grazing on water quality (see page 2-64). To correct this deficiency we believe that the final EIS should incorporate the findings of the:

U.S.D.I. Bureau of Land Management, The Effects of Surface Disturbance on the Salinity of Public Lands in the Upper Colorado River Basin, 1977 Status Report.

Livestock Grazing Management and Water Quality Protection, EPA and BLM draft document, May 26, 1978.

The data presented in the above mentioned publications presents the effects of heavy grazing on vegetative cover, soil compaction, runoff, and sedimentation. The results indicate a need to analyze the objectives of livestock forage production, watershed protection and to identify areas of potential conflict. Analysis of the available data should be made a part of the final EIS.

The benefits of the proposal to chain and seed 5,080 acres of land to enhance the forage quality for livestock and wildlife need supportive data. Page III of the BLM report, The Effects of Surface Disturbance on the Salinity of Public Lands in the Upper Colorado River Basin, discusses the control of juniper-pinyon vegetation for increasing livestock and wildlife forage and improving watershed conditions. It was found that "where trees were chained and windrowed and the areas seeded to grass, water and sediment yields increased over yields measured on adjacent native juniper-pinyon woodland stands. This occurred even though ground cover made up by grass, forbs, and litter was higher on the chained, windrowed, and seeded sites."

The 208 Water Quality Planning Agency for the five county area has recently received detailed information from the Soil Conservation District in Washington County regarding agricultural non-point sources. Further, the 208 agency has water quality data for Washington County which identifies salt loads for the Santa Clara and Virgin River systems.
2 We suggest you contact Joe Melling, 208 Project Director, St. George, Utah (801-673-3548) and coordinate the Hot Desert grazing proposals with the above mentioned 208 information.

This action by your agency would be in keeping with Section 202 - Land Use Planning of the Policy and Management Act of 1976. The bill requires that agency plans conform to land use plans of State and local governments "to the maximum extent."

Based on procedures adopted by EPA to rate an EIS, the Hot Desert Draft Environmental Impact Statement will be listed in the Federal Register in Category ER-2. This means EPA has reservations concerning the environmental effects of certain aspects of the proposed action, and we ask that your agency reassess those aspects. The final EIS should include current data on water quality impacts.

We would like to thank you for the opportunity to make comments on the draft EIS. If we may be of further service, please contact us.

Sincerely yours,

David A. Wagner

Alan Merson
Regional Administrator

cc: Joe Melling, Project Director

RESPONSE: U.S. Environmental Protection Agency, Denver, Colorado

1. The impact assessment for water quality was reviewed to assure that it reflects the most current information available. The statement on page 2-64 of the draft ES, "No studies are available to indicate the impacts of grazing on public lands on the quality of waters," was referring specifically to public lands within the ES area in Washington County, Utah. This sentence has been modified to make that point clear (Chapter 2, Water Resources and Fisheries, Water Quality). A review of the two documents referenced shows that they did not contain any specific studies or data directly applicable to Washington County, Utah.

2. Mr. Melling was contacted on July 26, 1978. Information from the 208 report was as follows: "The low forage yields of most grazing lands serve to disperse cattle sufficiently to preclude serious water quality problems. The problems associated with water quality contamination from rangeland cattle are insignificant when compared to cattle in confinements".

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SIERRA CLUB 530 Bush Street San Francisco, California 94108 (415) 981-8634

17 July 1978

District Manager
BLM Box 729
Cedar City, UT 84720

COMMENTS ON HOT DESERT GRAZING MANAGEMENT EIS

Dear Mr. Jensen,

I work for the national conservation staff of the Sierra Club on public lands issues and in this capacity wish to offer my comments on the Hot Desert Grazing Management Environmental Impact Statement.

First, I would like to thank the authors of this statement for a readable, reasonably concise, and candid document. It is unfortunate that the lack of conformity between the different grazing EISs now being issued makes it very difficult to understand one of the EISs after having read another: I am sure this is also stifling the transfer of experience and knowledge from one EIS team to others. Changes in policy and the use of different terminology add to the confusion. This is certainly not the responsibility of the District, but it is a problem of significance and one that will grow with the proliferation of EISs to be completed in upcoming years. One thing that might be done in this EIS to help would be to make sure that all critical terms and concepts used are adequately (and simply) defined or explained.

1 One area I found particularly confusing--though I feel I might not have had I not been involved in two other grazing plans recently--was that of "forage production." At various points I had to stop and try to figure out whether forage figures presented in the EIS included only forage allocated to livestock or included that allocated to wildlife as well, if the wildlife allocations were just for wildlife feed or if they included considerations of cover and litter, and if a utilization factor was included (i.e., only 50-60% of grass and browse production is allocated) and if that included wildlife needs. Clarification on this point, I believe, could simplify many parts of the statement.

2 It would also be helpful if the reader were told how the information presented was used. For example, it seems as if the soil surveys were used only to help calculate potential forage production but were not used in designing erosion control into the grazing management plan. Similarly, the information presented on endangered species seemed to have been left hanging.

This EIS is to be congratulated on offerring a well-defined program on the basis of available information on forage conditions, and not having sunk in the mire of attempting to measure every blade of grass on the unit. I am sure ranchers, conservationists and BLM personnel all would agree that monitoring and studies do not, by themselves, solve problems. But while the major program does not stumble over this, some smaller problems do--notably

the problem of conflict between livestock and the desert tortoise, and some of the conflicts in riparian areas. The information on the condition of these areas presented in chapter two consists of generalizations only: but I am sure the BLM has the information necessary to expand this section to include specifics without further study. Even at this distance a fairly dependable assessment is possible--it would be surprising if riparian areas are not severely impacted in an arid area being grazed at or near capacity.

3 Chapter 4 leans heavily on further study and monitoring, and I would hope this could be changed. The fact that the impacts are included in this chapter indicates that to a significant degree the problems are known and that they could be mitigated before further study. A further problem with chapter 4 is that its possibly substantial cost, for fencing and other measures, is not accounted in the EIS. My experience with the Bureau's budget process leaves me with the feeling that this lack of accounting at this phase could well lead to problems funding mitigation. Perhaps, at the least, a mitigation "slush fund" should be set up as part of the proposed action and alternatives.

The studies and monitoring proposed in chapter 4 and in chapter 1 reflect a legitimate uncertainty concerning the results of implementing intensive management systems. Eliminating the uncertainty is impossible and, considering the fruitless expense incurred elsewhere by the Bureau in attempts to do that impossibility, extremely undesirable. However, such information as is available that would reduce the uncertainty (i.e., research or even informal accounts of the results of systematic grazing management schemes in comparable areas) and some evaluation of how great the uncertainty is would be very useful.

4 Even more important is an explanation of why these grazing management schemes were selected for the proposed action. The systems are described, but the motivation for the Bureau's decision to suggest their implementation in this area is not. This goes beyond strict environmental analysis as the Bureau has practiced it, but I feel it would be a great step forward in making public involvement and understanding of Bureau planning a reality.

5 An important element of uncertainty on western rangelands is, of course, variation in precipitation. It would be helpful if information were presented linking the forage figures used in the EIS with rainfall figures. Were the survey years average in rainfall? What variation is there from year to year in precipitation, and what effect will that have within the proposed grazing systems?

The historical and continuing deterioration of the western range is the foremost problem BLM planning must address. That this is the case in the Hot Desert unit is born out by BLM data showing 43.7% of the public grazing lands in this unit to be in poor condition and 49% to be declining in condition. The Soil Conservation Service classified 42% of the public range in poor condition, and that after excluding 231,000 acres as not even suited to livestock use. The SCS classified nearly half the unit as not a range site and the BLM survey describes 1/4 of the unit as not properly allocated to livestock use.

Starting from this--poor range condition and large amounts of unsuitable land--I would like to present arguments against the proposed action and for possible alternatives.

6 Though both BLM and the SCS found large areas unsuitable for livestock use, only 13,505 acres--2.6% of the unit--is actually excluded from grazing in the proposed action. My immediate reaction to this is to ask why? Why is a planning unit with such diverse values divided up in such a way that livestock use is the dominant value on 97% of the area. Expensive intensive management is to be implemented on 93% of the area, but the EIS indicates low probability of success in meeting management objectives on 145,056 acres (27% of the unit). The objectives that will not be met will be resource objectives. The numbers of cows run on public lands--one resource objective for the Bureau's multiple-use system--will be met regardless of the failure to meet a number of other goals, if this proposal is implemented as presented. The EIS fails to reveal any good reason this should happen.

In fact, the EIS reveals that the Hot Desert area is one of the least dependent in the entire West on public lands grazing. Only 10 larger operators are dependent on their cattle operations for their livelihood, though no assessment is offered of how dependent they are on their public lands priveleges. Only 8% of regional employment is agricultural, only half of that is principle employment and only part of that is involved in public lands grazing.

Another measure of the value of public lands grazing to the area is the very low capital value of BLM grazing priveleges--$7 to $13 per AUM, as compared with over $40 per AUM paid recently in a transaction in Nevada for priveleges that the buyer was informed were likely to be drastically reduced or even cancelled as a result of grazing management planning in the area. The total capital value of present permits in the Hot Desert unit is less than half the amount of money the Bureau proposes spending on range developments for the unit.

7 Even more important is the cost of the proposed action in terms of adverse impacts on resources the Bureau has a mandate in FLPMA to manage on a sustained yield basis. The EIS predicts declining forage yield from an already overburdened range on 56,000 acres under the proposed action--even after 24 years. The EIS also indicates declining wildlife due to impacts on forbs and browse. Many riparian areas would continue to decline in condition and that would have a great effect on wildlife. Even so briefly outlined, this is a significant list of negative impacts. No action is without impacts, of course, but the question is what is the public receiving in return for these impacts on its lands? What is this being traded off for?

Livestock use being the major source of these negative impacts, the answer seems to be that we are trading for 21,000 AUMs of forage for domestic animals each year. As Millie Ehrman stated in her comments on this EIS, the Sierra Club recognizes the controlled grazing of livestock as one of the valid uses of the public lands. But this use, like any other within a multiple-use system, must be evaluated in terms of other possible uses and values, and from a national as well as local perspective.

The EIS reveals serious environmental costs and a high price-tag for the proposed action, but reveals little in the way of positive impacts to compensate for this. The socioeconomic profile of the St. George area shows no overwhelming need to tolerate the level of negative impacts predicted for the proposed action.

The negative impacts could and should be eliminating by designing a plan using the no grazing situation (described in alternative 1) as a starting point and incorporating levels, systems and locations of grazing that are consistent with improvement of range condition throughout the unit and with the reversal of the negative impacts grazing at present levels is causing on the unit's wildlife, watershed, soils and recreation values.

The opportunity for profitable livestock grazing on public lands should only be exploited where it will not cause undue negative environmental impacts. In some areas it may be desirable to invest money to mitigate negative impacts while sustaining present grazing levels. But I do not believe substantial investments of this sort are justified in the Hot Desert area, which is economically independent of public lands grazing. The investment outlined in the proposed action is further counterindicated by the projected failure of this investment to fully eliminate significant negative impact of grazing on the area.

The logical action for this area, in light of the information presented in the EIS, would be to reduce grazing levels to improve range conditions and reverse the negative impacts of grazing at current levels. The large number of already fenced allotments should make it possible to incorporate systematic livestock management that would hasten improvement of range condition without new developments. Management with existing developments could maximize the grazing levels attainable while meeting resource goals and holding down costs.

Please contact me if I can be of any further help, either in explanation of my comments or in any other way. My interest in this planning unit is by no means exhausted by these comments. I especially wish to keep track of the development of wilderness inventory and the interface of that process with the implementation of grazing management efforts. I have not specifically addressed the wilderness issue in these comments because of the uncertainty of Bureau policy at the national level and because my primary intent was to address the Hot Desert Grazing EIS as a whole, in terms of multiple-use planning. The Sierra Club supports the Bureau's efforts to implement comprehensive multiple-use planning on its lands and will do all it can to ensure the success of those efforts in this and every other unit of the public lands.

Sincerely yours,

Russell Shay

Russell Shay
National Conservation Staff

ps. I would greatly appreciate being informed of the progress of the Hot Desert EIS, and would appreciate a response to these comments if possible. RS.

cc: Frank Gregg, Johanna Wald, Sierra Club Southwest Office, Tina Nappe, Millie Ehrman

RESPONSE: Sierra Club, San Francisco, California

1. Appendix X, under "Allocation of Grazing Capacity to Livestock and Wildlife", explains how the forage is allocated to livestock and for wildlife.

2. The information in Chapter 2 was used as baseline data from which, through a multiple use analysis process, land use allocations were determined. This is explained in Chapter 1, Interrelationships, Management Framework Plan.

3. Until the monitoring program explained in Chapters 1 and 4 reveals a need for additional range developments, no cost studies can be made. The monitoring may indicate a change in season of use, use of alternate water sites, or reduction in livestock numbers, none of which may require expenditures.

4. This is explained in Chapter 1, Interrelationships, Description of the Planning System, the Virgin River MFP, and table 1-11.

5. Variation in rainfall and probabilities of receiving rainfall are included in Chapter 2, tables 2-1 and 2-2. An explanation of how climate and other elements of the environment interrelate in the Hot Desert can be found in the Introduction to Chapter 2.

6. The 13,505 acres in three allotments were considered unsuitable for livestock grazing because of a combination of limiting factors discussed in Chapter 1, Elimination of Grazing. These factors include steepness of slope, lack of livestock forage, other high resource values, critical watershed conditions, or any combination of these factors. There are approximately 130,573 acres unsuitable for livestock grazing on public land in the Hot Desert area which are included within the boundaries of the grazing management allotments but no livestock carrying capacity is allowed from these unsuitable acres.

7. The trade offs are discussed in the MFP and URA processes. The significant considerations are shown in table 1-11 under the columns Multiple Use Considerations and Resource Use Foregone for Grazing.

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UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

4012 Federal Building, 125 South State Street, Salt Lake City, UT 84111

July 28, 1978

District Manager
Bureau of Land Management
P.O. Box 729
Cedar City, Utah 84720

Dear Sir:

We have reviewed the Draft Environmental Statement prepared by the Bureau of Land Management on the proposed Hot Desert Grazing Management Plan in Washington County, Utah. The statement adequately covers the areas of consideration where the Soil Conservation Service has expertise or interest.

JUL 31 1978

Attached are some specific comments which may assist you in preparing the final Environmental Statement. We appreciate the opportunity to review this document and provide comments.

Sincerely,

George D. McMillan
State Conservationist

Attachment

cc: Director, Environmental Services Division Soil Conservation Service, Washington, D.C. 20250

(5) Director, Office of Federal Activities (Mail Code A-104)
Environmental Protection Agency, Rm. 537, West Tower,
401 M Street S.W.
Washington, D.C. 20460

SCS COMMENTS
Draft Environmental Statement
on the
Hot Desert Grazing Management Plan
Prepared by the
Cedar City District, Bureau of Land Management

1. Almost 75% of this statement is devoted to the description of the environment, the proposed action, alternatives, and appendix material. The February 10, 1976 memorandum from the Council on Environmental Quality emphasizes the Council's position on the content of environmental statements. An attempt should be made to rank, then analyze in depth the most significant environmental impacts. The bulk of the remaining material could be left to a back up file.

2. The format used in this document leads to duplication and there is a lot of redundancy in the narrative. For example, on page 1-5, the third and fourth paragraphs repeat the same basic thought three times.

3. The "Discription of Proposal" section discusses conflicts and effects which should be left to the "Impact" section.

(1)

4. The "Total Expenses 1974" figure in Table 2-18, appears to be an error.

5. Proper grazing use is essential in a rest rotation grazing system.

6. It is difficult to predict potential yield and composition from vegetive types. The range site and condition concept produces more accurate information. This would provide a better estimate of grazing capacities.

7. Paragraph three of the summary discusses soil loss and range production. The estimates of increased vegetation and decreased erosion are extremely conservative.

8. Table 2-7, Page 2-29, lists specific dates for plant phenological stages. It would be more accurate to show a range of dates for each stage.

9. The captions on Tables 2-8, 2-9, appear to be reversed.

10. The discussion on page 2-99, third paragraph, implies that all grazing use is by livestock. Big game also uses grass species.

11. If the soils in the Alger Hollow and Twin Peaks seeding proposals are not adapted to seeding, as stated in Table 3-4, then seeding should not be planned for these areas.

12. Page 3-40, last paragraph, discusses long term loss of vegetation around structural developments. These developments should be located in areas where adverse impact are minimized.

13. On page 5-6, why do the proposed stocking rate on 27 allotments exceed the surveyed grazing capacity.

14. The problem of competition between cattle and Desert Tortoise could be solved by proper grazing use rather than elimination of grazing by livestock.

RESPONSE: Soil Conservation Service, Salt Lake City, Utah

1. Changes have been made as a result of comments 4, 9, and 10.

The following letters contained comments which did not deal with the adequacy of the statement:

United States Department of the Interior,
Bureau of Reclamation Upper Colorado Regional Office

LeRoy Larson

Ashby Reeve

United States Department of the Interior,
Bureau of Reclamation, Lower Colorado Regional Office

United States Department of the Interior

BUREAU OF RECLAMATION
UPPER COLORADO REGIONAL OFFICE
P.O. BOX 11568
SALT LAKE CITY, UTAH 84147

IN REPLY REFER TO: 151
706.

JUN 26 1978

Memorandum

To: District Manager, Bureau of Land Management, P. O. Box 729, Cedar City, Utah 84720

From: ASSISTANT Regional Director, Salt Lake City, Utah

Subject: Review of Draft Environmental Statement - Hot Desert Grazing Management

The above draft environmental statement involves land that is not located in the Upper Colorado Region. It appears that no further review or comment is appropriate by this office.

R. W. Wehbey

cc: State Director, Bureau of Land Management, University Club Building, 136 East South Temple, Salt Lake City, Utah 84111

(1)

St George Ut
July 16 1978

B.L.M.
Cedar City, Utah

I am writing to state my thots on the environment statement draft.

Big Mountain Allotment

I have had sheep or cattle on this allotment since 1922 so I know first hand just what has happened in the last 55 years. At one time there were nine (9) herds of sheep in the Bull Valley area and one or two herd stayed there year long.

I have almost 3 miles of fence between my private lands and the B.L.M. lands. Also I have maintained the Forest Reserve fence every since it was made almost without help what so ever by anyone. I want my private land away from the B.L.M. lands but will compromise on a few 40s if we can

2

agree.

I am willing to go over the allotment at anytime with the B L M. officials.

As for the the deer there is 1/10 as many now as there were when there were 9 herd of sheep in the area.

Apex Slope Allotment

It is in Three pastures now but needs a few miles more of fence to make it in 4 or 5 pastures. There are 4 deep canyons that goes east towards the river that are impossible for livestock to cross them, they must come to the head of them to get around.

I have herded sheep there off and on for nearly 60 years.

I am willing to go over the allotment at anytime with the B L M officials.

(3)

The stock has been cut in numbers to where it is impossible to survive. In 1940 there were 4 or 5 time as many stock as there are now.

The B L M has promised to make water catchments to get water for the last 20 years but the only catchments there are what I have made.

There are no water on the allotment and must be hauled by truck.

Sincerely Yours

LeRoy Larson
380 South 500 East
St George, Utah
84770

July 17, 1978

Dear District Manager,

This letter is to comment on the Hot Desert Environmental Statement.

I feel there is a lot of inaccurate data in this book and a waste of the taxpayers' money.

I feel we should go back to the old section four permits to improve the range.

You have us now so that we feel we have no rights to improve the range.

I also feel we should go back to the ten year permits so we could be able to plan for the future.

Yours truly,
Ashby Reeve

United States Department of the Interior
BUREAU OF RECLAMATION
LOWER COLORADO REGIONAL OFFICE
P.O. BOX 427
BOULDER CITY, NEVADA 89005

IN REPLY REFER TO: LC-150
120.1

July 17, 1978

District Manager
Bureau of Land Management
P.O. Box 729
Cedar City, Utah 84720

Dear Sir:

We have reviewed the Draft Environmental Statement on the proposed Hot Desert Grazing Management Plan in Washington County, Utah. We are enclosing copies of the comments which were written in the margins of the document.

Thank you for the opportunity to review this document.

Sincerely,

F. Phillip Sharpe
Regional Environmental Officer

Enclosures

In duplicate

AMERICAN REVOLUTION BICENTENNIAL 1776-1976

The following letter was received too late for response:

William Radtkey

July 23, 1978

District Manager
Bureau of Land Management
P. O. Box 729
Cedar City, Utah 84720

Dear Sir:

The following are my comments on the Hot Dosert Draft Environmental Impact Statement:

The stated purpose of the proposed action, page 1-3, is to "maintain or improve --- wildlife through the use of grazing management". Yet nowhere do you demonstrate that any wildlife habitat will be maintained or improved. The alternatives proposed, with the exception of alternative #1, all propose a program of continuing wildlife habitat deterioration. The only difference being the rate of deterioration.

Spring, well and reservoir development; the only stated benefit of "improved" water supplies, that can be demonstrated, is improved livestock distribution. There is no analysis of the adverse impacts of increased livestock grazing in an area which was previously grazed to a lesser intensity, or, ungrazed. There is no evidence that artificial water supplies improve conditions for naturally occurring wildlife populations. In fact, there is considerable evidence to demonstrate that adverse impacts will occur to the wildlife habitat.

There apparently has been little wildlife inventory conducted. The analysis is directed only to the game species and a few others such as the desert tortoise. There is reference, page 2-47, to some important distribution patterns for mammals and reptiles. The species however, are not identified nor is there any analysis of what impacts may occur to the significant habitats.

To make this analysis meaningful there should be an analysis of impacts by habitat type and by wildlife species occurrence in each habitat.

In summary, I think you have demonstrated quite clearly that there can be no analysis of impacts unless there is a comprehensive inventory of the wildlife resource.

Very truly yours,

WRadtkey

William H. Radtkey,
Wildlife Biologist
3005 Stanton Circle
Carmichael, California 95608

REFERENCE MATERIAL

App

[redacted]

APPENDIX I

Livestock Stocking Rates on Public Lands (Animal Unit Months)

Allotment		Present Allowable Stocking Rate Base Property Qualifications	Proposed Action Normal Operation	Potential Stocking Rates: Livestock Forage Potential	Potential Stocking Rates: Ecological Livestock Forage Potential
INTENSIVE MANAGEMENT					
Alger Hollow	(Total)	1,310	872	1,032	1,901
Alger Hollow		734	......	......	398
Diamond Valley		80	......	......	326
Wide Canyon		284	......	......	732
Sand Wash		212	......	......	445
Apex Slope	(Total)	366	366	403	443
Beaver Dam Slope	(Total)	3,311	2,490	3,307	7,810
Santa Clara Slope/Beaver Dam Slope		1,547	......	......	3,772
Indian Springs		1,150	......	......	3,151
Castle Cliffs		614	......	......	887
Big Mountain	(Total)	490	325	422	1,236
Boomer Hill	(Total)	156	138	196	141
Boomer Hill		56	......	......	74
Cove Wash		100	......	......	67
Boot Spring	(Total)	100	60	87	61
Bull Mountain	(Total)	373	100	143	3,657
Central	(Total)	366	368	432	332
Coalpits	(Total)	166	82	175	364
Cougar Canyon	(Total)	120	120	364	1,435
Curly Hollow	(Total)	1,362	1,056	1,255	633

Note: Appendix X contains a description of the methods used to derive potential stocking rates. It includes an explanation of the differences in ecological and livestock forage potentials. Ecological vegetative condition is described in Chapter 2, Vegetation.

(continued)

APPENDIX I (continued)

Allotment		Present Allowable Stocking Rate Base Property Qualifications	Proposed Action Normal Operation	Potential Stocking Rates Livestock Forage Potential	Ecological Livestock Forage Potential
Dagget Flat	(Total)	309	272	412	401
Desert Inn	(Total)	1,584	1,335	2,251	5,640
Dome	(Total)	345	120	157	99
Dome		186	......	......	79
Warner Valley		159	......	......	20
Fort Pierce	(Total)	2,039	1,673	2,345	1,015
Fort Pierce, UT		845	......	......	472
Fort Pierce, AZ		384	......	......	NA
Spendlove		810	......	......	543
Gooseberry	(Total)	256	256	279	257
Grafton	(Total)	448	128	162	528[a]
Gunlock	(Total)	490	240	351	219
Herd House	(Total)	140	105	120	128
Hurricane	(Total)	122	84	101	193
Hurricane Fault	(Total)	1,755	1,218	1,569	1,602
Eagle		63	......	......	64
Terrace		396	......	......	503
Frog Hollow		323	......	......	328
Workman Wash		272	......	......	193
Gould		633	......	......	439
Gould Ranch		68	......	......	75
Hurricane Mesa	(Total)	225	30	79	553
Jackson Wash	(Total)	1,682	1,450	1,746	3,471
Land Hill	(Total)	60	39	59	67
Little Creek	(Total)	641	641	754	914

[a]Includes potential for North Grafton.

NA = Not available

(continued)

APPENDIX I (continued)

Allotment		Present Allowable Stocking Rate Base Property Qualifications	Proposed Action Normal Operation	Potential Stocking Rates Livestock Forage Potential	Potential Stocking Rates Ecological Livestock Forage Potential
Mesa	(Total)	90	24	41	183
Minera Wash	(Total)	255	206	259	598
Red Cliffs	(Total)	782	376	602	474
Red Cliffs		554	......	......	317
Silver Reef		80	......	......	148
Leeds		148	......	......	9
Sand Mountain	(Total)	2,300	1,477	2,285	2,030
Sand Mountain		1,556	......	......	1,340
Sand		504	......	......	472
Sand Mountain Spring		240	......	......	218
Sandstone Mountain	(Total)	114	93	147	107
Santa Clara Creek	(Total)	117	69	93	86
Scarecrow Peak	(Total)	2,246	1,680	2,125	3,646
Catclaw		228	......	......	153
Terry		529	......	......	697
Beaver Dam Wash		1,489	......	......	2,796
Short Creek	(Total)	516	555	634	535
Short Creek		288	......	......	191
Canaan Gap		288	......	......	155
Canyon		60	......	......	189
Smith Mesa	(Total)	144	36	36	113
Toquerville	(Total)	392	188	243	574
Toquerville		146	......	......	120
Pintura		90	......	......	257
Ash Creek		88	......	......	148
LaVerkin		68	......	......	49
Trail	(Total)	240	147	164	379

[a]Includes potential for North Grafton.

NA = Not available

(continued)

APPENDIX I (continued)

Allotment		Present Allowable Stocking Rate: Base Property Qualifications	Proposed Action: Normal Operation	Potential Stocking Rates: Livestock Forage Potential	Potential Stocking Rates: Ecological Livestock Forage Potential
Twin Peaks	(Total)	1,428	1,112	1,656	3,191
Veyo	(Total)	342	339	468	819
Virgin	(Total)	251	136	160	244
Virgin		183	......	......	221
Mountain Dell		68	......	......	23
Warner Ridge	(Total)	64	45	65	57
Washington	(Total)	248	153	176	312
White Dome	(Total)	35	100	108	166
SUB TOTAL		27,780	20,304	27,463	46,614
Custodial in AMPs[b]					
Coalpits		c	49	49	c
Fault		54	37	37	c
Herd House		c	33	33	c
Hurricane		c	12	12	c
Hurricane Mesa		c	49	49	c
Mesa		c	17	17	c
Scarecrow Peak Snow Holding Pasture		c	d	d	d

[a]Includes potential for North Grafton.
[b]Livestock forage potentials for custodial allotments are the same as the proposed action, normal operation, because the objective is to maintain the present stocking rate.
[c]Included in intensive management allotments.
[d]Used as a holding pasture only; AUMs are not allocated.

NA = Not available

(continued)

APPENDIX I (continued)

Allotment	Present Allowable Stocking Rate Base Property Qualifications	Proposed Action Normal Operation	Potential Stocking Rates Livestock Forage Potential	Ecological Livestock Forage Potential
Virgin				
Mountain Dell	c	16	16	c
White Dome	c	8	8	c
SUB TOTAL	54	221	221	0
CUSTODIAL				
Airport	9	7	7	6
Black Canyon	15	12	12	55
Box Canyon	48	48	48	52
Cinder Mountain	154	27	27	57
Dalton Wash	33	26	26	54
Lamoreaux	55	11	11	0
Little Plain	60	16	16	85
North Grafton	31	12	12	c
Red Butte	126	12	12	11
Rock Spring	85	12	12	29
Sand Hills	110	28	28	70
Sand Wash Reservoir	41	13	13	NA

[a]Includes potential for North Grafton.
[b]Livestock forage potentials for custodial allotments are the same as the proposed action, normal operation, because the objective is to maintain the present stocking rate.
[c]Included in intensive management allotments.
[d]Used as a holding pasture only; AUMs are not allocated.

NA = Not available (continued)

APPENDIX I (concluded)

Allotment	Present Allowable Stocking Rate: Base Property Qualifications	Proposed Action: Normal Operation	Potential Stocking Rates: Livestock Forage Potential	Potential Stocking Rates: Ecological Livestock Forage Potential
Stout	19	2	2	41
Yellow Knolls	123	16	16	16
SUB TOTAL	909	242	242	476
ELIMINATION OF GRAZING				
LaVerkin Creek	99	0	0	1,237
Pace Knoll	0	0	0	220
Pintura Seeding	63	0	0	257
SUB TOTAL	162	0	0	1,714
TOTAL	28,905	20,767	27,926	48,804

[a] Includes potential for North Grafton.
[b] Livestock forage potentials for custodial allotments are the same as the proposed action, normal operation, because the objective is to maintain the present stocking rate.
[c] Included in intensive management allotments.
[d] Used as a holding pasture only; AUMs are not allocated.

NA = Not available

APPENDIX II

Proposed Allotment Management Plan Objectives

Allotment	Proposed Normal Operation Livestock (AUMs)	Proposed Normal Operation Wildlife[a] (AUMs)	WATERSHED Surface Factor Reduction in Points	WATERSHED Soil Groundcover Percent Increase	WATERSHED Litter Percent Increase	VEGETATION Key Species	VEGETATION Percent Increase	Livestock[b] Forage Potential (AUMs)	Potential Wildlife Needs (AUMs)
INTENSIVE MANAGEMENT									
Alger Hollow	872	1,111	11.2	8.2	10.6	Crested wheatgrass (Agcr) Big Galleta (Hiri) Galleta (Hija) Mormon tea (Epne)	13.0 12.0 6.0 5.0	1,032	1,110
Apex Slope	366	130	5.0	Maintain present condition	7.0	Crested wheatgrass (Agcr) Spiny hopsage (Grsp) Big sagebrush (Artr)	5.0 Maintain 6.0	403	75
Beaver Dam Slope	2,490	1,626	6.5	5.0	5.5	Muhlenbergia (Mupo) Mormon tea (Epne)	5.0 5.5	3,307	99
Big Mountain	325	810	6.0	5.0	6.0	Muttongrass (Pofe)	7.0	422	760
Bcomer Hill	138	89	5.0	5.0	5.5	Big galleta (Hiri) Mormon tea (Epne)	5.5 4.5	196	75
Boot Spring	60	90	10% reduction	10.0	10.0	Desert Bitterbrush (Pugl) Mormon tea (Epne)	....	87	10
Bull Mountain	100	1,131	Maintain present condition	Maintain present condition	Maintain present condition	Red top (Agal)	7.0	143	1,110
Central	368	74	1.0	7.5	6.7	Crested wheatgrass (Agcr) Cliffrose (Come)	14.0 5.0	432	70
Coalpits and Fault[c]	168	116	Maintain present condition	Maintain present condition	Maintain present condition	Galleta (Hija)	....	261	100
Cougar Canyon	120	766	8.0	4.0	6.0	Muttongrass (Pofe)	6.0	364	720
Curly Hollow	1,056	491	7.3	5.7	6.0	Big Galleta (Hiri) Mormon tea (Epne)	5.0 5.0	1,255	200
Dagget Flat	272	516	5.4	4.5	4.4	Crested wheatgrass (Agcr) Pubescent wheatgrass (Agtr)	6.0 6.0	412	440

[a]AUMs based on dual use by deer and livestock. Additional AUMs available for wildlife from plant species not utlized by livestock.

[b]Potential livestock production on public lands includes projected AUMs available from the proposed vegetative manipulation projects. No increased production of livestock forage over existing levels is predicted for custodial allotments or portions of allotments containing custodial tracts; current levels of livestock forage production are predicted to be maintained in the long term.

[c]These allotments have small custodial portions included with the regular grazing management system. AUMs for livestock (normal operation and potential) include both components; other site specific objectives including wildlife AUMs address grazing management systems only. AUMs allocated for the custodial portions can be found in Appendix I, "Custodial in AMPs".

(continued)

Allotment	Proposed Normal Operation Livestock (AUMs)	Proposed Normal Operation Wildlife[a] (AUMs)	WATERSHED Surface Factor Reduction in Points	WATERSHED Soil Groundcover Percent Increase	WATERSHED Litter Percent Increase	VEGETATION Key Species	VEGETATION Percent Increase	Livestock[b] Forage Potential (AUMs)	Potential Wildlife Needs (AUMs)
Desert Inn	1,335	2,452	5.0	Maintain present condition	6.0	Crested wheatgrass (Agcr) Pubescent wheatgrass (Agtr) Mutton grass (Pofe)	Maintain Maintain 5.0	2,251	2,240
Dome	120	64	9.0	9.0	11.0	Big galleta (Hiri) Mormon tea (Epne)	18.0 14.0	157	25
Fort Pierce	1,673	562	13.0	8.0	8.0	Indian ricegrass (Orhy) Four-wing saltbush (Atca)	10.0 10.0	2,345	10
Gooseberry	256	70	Maintain present condition	Increase	Increase	Crested wheatgrass (Agcr)	10.0	279	360
Grafton	128	90	10.0	Increase	Increase	Mormon tea (Epne) Desert bitterbrush (Pugl)	....	162	90
Gunlock	240	80	8.7	10.0	16.3	Sand dropseed (Spcr) Mormon tea (Epne)	10.0 6.0	351	50
Herd House[c]	138	24	6.0	8.0	8.0	Big galleta (Hiri) Mormon tea (Epne)	10.0 7.0	153	10
Hurricane[c]	96	30	8.0	7.0	5.0	Mormon tea (Epne) Galleta (Hija)	5.0 6.0	113	20
Hurricane Fault	1,218	72	11.0	6.0	9.0	Four-wing saltbush (Atca) Galleta (Hija)	3.0 5.0	1,569	70
Hurricane Mesa[c]	79	280	Maintain present condition	Maintain present condition	Maintain present condition	Antelope Bitterbrush (Putr) Desert bitterbrush (Pugl)	....	128	280
Jackson Wash	1,450	682	8.5	6.0	5.0	Mormon tea (Epne) Crested wheatgrass (Agcr)	5.0 50.0	1,746	550
Land Hill	39	27	5.0	5.0	5.0	Mormon tea (Epne)	5.0	59	25

[a]AUMs based on dual use by deer and livestock. Additional AUMs available for wildlife from plant species not utlized by livestock.

[b]Potential livestock production on public lands includes projected AUMs available from the proposed vegetative manipulation projects. No increased production of livestock forage over existing levels is predicted for custodial allotments or portions of allotments containing custodial tracts; current levels of livestock forage production are predicted to be maintained in the long term.

[c]These allotments have small custodial portions included with the regular grazing management system. AUMs for livestock (normal operation and potential) include both components; other site specific objectives including wildlife AUMs address grazing management systems only. AUMs allocated for the custodial portions can be found in Appendix I, "Custodial in AMPs".

(continued)

APPENDIX II (continued)

Allotment	Proposed Normal Operation Livestock (AUMs)	Proposed Normal Operation Wildlife[a] (AUMs)	WATERSHED Surface Factor Reduction in Points	WATERSHED Soil Groundcover Percent Increase	WATERSHED Litter Percent Increase	VEGETATION Key Species	VEGETATION Percent Increase	Livestock[b] Forage Potential (AUMs)	Potential Wildlife Needs (AUMs)
Little Creek Mountain	641	59[d]	7.0	7.0	20.0	Crested wheatgrass (Agcr)	8.0	754	240
Mesa[c]	41	100	Maintain present condition	Maintain present condition	Maintain present condition	Antelope Bitterbrush (Putr) Desert bitterbrush (Pugl)	....	58	80
Minera Wash	206	427	13.0	6.0	8.0	Antelope Bitterbrush (Putr) Crested wheatgrass (Agcr) Cliffrose (Come)	5.0 5.0 5.0	259	340
Red Cliffs	376	200	6.0	5.0	7.0	Mormon tea (Epne) Big Galleta (Hiri)	5.0 9.0	602	100
Sand Mountain	1,477	663	9.0	6.0	6.0	Indian ricegrass (Orhy) Four-wing saltbush (Atca)	6.0 5.0	2,285	50
Sandstone Mountain	93	65	Maintain present condition	Maintain present condition	Maintain presend condition	Mormon tea (Epne) Big Galleta (Hiri)	Maintain Maintain	147	10
Santa Clara Creek	69	69	6.0	Maintain present condition	Maintain present condition	Mormon tea (Epne)	5.0	93	75
Scarecrow Peak[c]	1,680	900	6.0	6.0	5.5	Mormon tea (Epne)	7.5	2,125	750
Short Creek	555	75	9.0	6.0	6.0	Big Galleta (Hiri) Four-wing saltbush (Atca)	7.0 13.0	634	70
Smith Mesa	36	137	Maintain present condition	Maintain present condition	Maintain present condition	Antelope Bitterbrush (Putr) Desert bitterbrush (Pugl)	....	36	110
Toquerville	188	233	7.0	5.0	4.0	Big Galleta (Hiri) Mormon tea (Epne)	5.0 3.0	243	200
Trail	147	110	Maintain present condition	Maintain present condition	Maintain present condition	Mormon tea (Epne)	....	164	10

[a]AUMs based on dual use by deer and livestock. Additional AUMs available for wildlife from plant species not utlized by livestock.

[b]Potential livestock production on public lands includes projected AUMs available from the proposed vegetative manipulation projects. No increased production of livestock forage over existing levels is predicted for custodial allotments or portions of allotments containing custodial tracts; current levels of livestock forage production are predicted to be maintained in the long term.

[c]These allotments have small custodial portions included with the regular grazing management system. AUMs for livestock (normal operation and potential) include both components; other site specific objectives including wildlife AUMs address grazing management systems only. AUMs allocated for the custodial portions can be found in Appendix I, "Custodial in AMPs".

[d]This figure includes only AUMs in present seeding.

(continued)

APPENDIX II (continued)

Allotment	Proposed Normal Operation Livestock (AUMs)	Proposed Normal Operation Wildlife[a] (AUMs)	WATERSHED: Surface Factor Reduction in Points	WATERSHED: Soil Groundcover Percent Increase	WATERSHED: Litter Percent Increase	VEGETATION: Key Species	VEGETATION: Percent Increase	Livestock[b] Forage Potential (AUMs)	Potential Wildlife Needs (AUMs)
Twin Peaks	1,112	1,539	7.3	5.3	6.7	Crested wheatgrass (Agcr) Muttongrass (Pofe) Mormon tea (Epne) Antelope Bitterbrush (Putr)	9.0 8.0 8.0 8.0	1,656	1,540
Veyo	339	234	9.5	8.5	7.5	Crested wheatgrass (Agcr)	9.0	468	230
Virgin[c]	152	144	6.0	4.0	5.0	Four-wing saltbush (Atca) Galleta (Hija) Mormon tea (Epne)	5.0 5.0 5.0	176	100
Warner Ridge	45	23	9.0	9.0	6.0	Big galleta (Hiri) Mormon tea (Epne)	17.0 8.0	65	15
Washington	153	306	Maintain present condition	Maintain present condition	Maintain present condition	Big Galleta (Hiri)	12.0	176	120
White Dome[c]	108	43	Maintain present condition	Maintain present condition	Maintain present condition	Big galleta (Hiri) Mormon tea (Epne)	Maintain Maintain	116	15
SUB TOTAL	20,525	16,710						27,684	12,554
CUSTODIAL[e]									
Airport	7	0	....	....	....	....	....	7	10
Black Canyon	12	8[f]	....	....	....	....	....	12	100
Box Canyon	48	0	....	....	....	....	....	48	10
Cinder Mountain	27	0	....	....	....	....	....	27	50
Dalton Wash	26	41	....	....	....	....	....	26	40
Lamoreaux	11	0	....	....	....	....	....	11	100

[a]AUMs based on dual use by deer and livestock. Additional AUMs available for wildlife from plant species not utlized by livestock.

[b]Potential livestock production on public lands includes projected AUMs available from the proposed vegetative manipulation projects. No increased production of livestock forage over existing levels is predicted for custodial allotments or portions of allotments containing custodial tracts; current levels of livestock forage production are predicted to be maintained in the long term.

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[d]This figure includes only AUMs in present seeding.

[e]There is no specific time frame designated for allotments having no increased production over existing levels.

[f]Deer graze mainly on private grain fields in these allotments.

(continued)

APPENDIX II (concluded)

Allotment	Proposed Normal Operation Livestock (AUMs)	Proposed Normal Operation Wildlife[a] (AUMs)	WATERSHED Surface Factor Reduction in Points	WATERSHED Soil Groundcover Percent Increase	WATERSHED Litter Percent Increase	VEGETATION Key Species	VEGETATION Percent Increase	Livestock[b] Forage Potential (AUMs)	Potential Wildlife Needs (AUMs)
CUSTODIAL (concluded)									
Little Plain	16	0	....	....	....	....	....	16	15
North Grafton	12	0	....	....	....	....	....	12	NA
Red Butte	12	0	....	....	....	....	....	12	75
Rock Spring	12	0	....	....	....	....	....	12	100
Sand Hills	28	50	....	....	....	....	....	28	10
Sand Wash Reservoir	.....	.....	....	....	....	....	....	.....	.....
Sand Cove	13	.....	....	....	....	....	....	13	25
Stout	2	0	....	....	....	....	....	2	10
Yellow Knolls	16	0	....	....	....	....	....	16	10
SUB TOTAL	242	99						242	555
ELIMINATION OF GRAZING									
LaVerkin Creek	0	269	....	....	....	....	....	0	269
Pace Knoll	0	3	....	....	....	....	....	0	30
Pintura Seeding	0	0	....	....	....	....	....	0	75
SUB TOTAL	0	272						0	374
TOTAL	20,767	17,081						27,926	13,483

[a]AUMs based on dual use by deer and livestock. Additional AUMs available for wildlife from plant species not utlized by livestock.

[b]Potential livestock production on public lands includes projected AUMs available from the proposed vegetative manipulation projects. No increased production of livestock forage over existing levels is predicted for custodial allotments or portions of allotments containing custodial tracts; current levels of livestock forage production are predicted to be maintained in the long term.

[c]These allotments have small custodial portions included with the regular grazing management system. AUMs for livestock (normal operation and potential) include both components; other site specific objectives including wildlife AUMs address grazing management systems only. AUMs allocated for the custodial portions can be found in Appendix I, "Custodial in AMPs".

[d]This figure includes only AUMs in present seeding.

[e]There is no specific time frame designated for allotments having no increased production over existing levels.

[f]Deer graze mainly on private grain fields in these allotments.

APPENDIX III

STATE OF UTAH

Scott M. Matheson, Governor

Michael D. Gallivan
Executive Director
104 State Capitol
Salt Lake City, Utah 84114
Telephone: (801) 533-5961

November 9, 1977

Mr. William G. Leavell
Associates State Director
U.S. Department of the Interior
Bureau of Land Management
University Club Building
136 East South Temple
Salt Lake City, UT 84111

Dear Mr. Leavell:

RE: Hot Desert Grazing Management, Cooperative Agreement No. 126

The staff has reviewed the Memorandum of Understanding and concur with the Cooperative Agreement. I have signed the Agreement and am returning one copy to you. Your proposed means to insure protection of cultural values is acceptable.

Should you have any questions, please contact Wilson G. Martin, Preservation Planner, Utah State Historical Society, Salt Lake City, Utah 84102, (801) 533-5755.

Sincerely,

Michael D. Gallivan
Executive Director
and
State Historic Preservation Officer

WGM:jjw:B153

CULTURAL RESOURCES
MEMORANDUM OF UNDERSTANDING
HOT DESERT GRAZING MANAGEMENT
BETWEEN
THE BUREAU OF LAND MANAGEMENT
AND THE
STATE OF UTAH

I. Purpose

The Bureau of Land Management, hereinafter referred to as the Bureau, is preparing the Hot Desert Grazing Management Environmental Statement (Hot Desert Grazing ES), under the provisions of the National Environmental Policy Act of 1969, for a portion of Washington County, Utah. The Bureau has determined that cultural values could be damaged or lost as a result of actions proposed in the Hot Desert ES. The Utah State Historic Preservation Office, hereinafter referred to as the State, is interested in assuring that damage and loss of cultural values in Utah be minimized. The Bureau and the State have consulted and agree as to the measures, outlined in this agreement, which should be undertaken to protect these values, should authorization be granted to use public lands in Utah for the purpose of the proposed project. In this agreement, "cultural values" means data and sites which have archaeological, historical, architectural, and cultural importance and interest.

II. Authority

This agreement is authorized under the Federal Land Policy and Management Act of 1976 and the National Historic Preservation Act of 1966. It is

in accord with Bureau policies and programs. It does not abrogate nor amend any other agreement between the Bureau and the State.

III. Responsibilities and Procedures

A. As part of the planning process and environmental analysis required prior to major grazing management decisions, the Bureau will search for archaeological and historical literature concerning the Hot Desert area. The Bureau has conducted a stratified random sample survey of one percent of the public lands in the Hot Desert area. The strata consisted of vegetative zones, and the sample units were quarter sections. The one percent survey provides for an intensive survey of each chosen quarter section, meaning that all cultural values observable on the surface of that area are recorded.

B. The Bureau will comply with 36 CFR 800.4(a) in identifying sites which are listed in or eligible for inclusion in the National Register for Historic Places.

C. After completing the planning and environmental analysis processes, should the proposed management be implemented, the Bureau will follow the following procedures:

1. Prior to initiation of ground-disturbing activities, literature searches and intensive surveys will be undertaken in all areas which would be disturbed.

2. Wherever possible and feasible, cultural values will be avoided by construction and related activities. This will be accomplished mainly by rerouting linear facilities, such as roads, fences, and pipelines and adjusting locations of other facilities.

3. Wherever it is not possible and feasible to avoid sites that contain cultural values, such values will be evaluated and salvaged if other protective measures are unavailable. Salvage operations will obtain as much data as possible from each site. In instances where access would greatly increase the possibility of vandalism, salvage may be required within a buffer zone to be determined by the Bureau.

4. To minimize damage or loss of cultural values not visible on the ground surface, a professional archaeologist will be present when ground-disturbing operations are underway.

5. Subsurface cultural values that are encountered during any construction will be salvaged, as there is no other recourse in such a situation.

D. The Bureau will provide reports and other information, as requested by the State.

E. The State will provide the Bureau with a letter, for use as an exhibit in the Hot Desert Grazing ES, to the effect that the measures proposed by the Bureau to minimize damage of cultural values will satisfy the State's interests.

IV. Implementation

A. This agreement will become effective on the date of the last signature of this agreement.

B. Either party may request revision or cancellation of this agreement by written notice, not less than 30 days prior to the time when such action is proposed.

C. Any problems resulting from this agreement which cannot be resolved by the Bureau and the State will be referred to the Secretary of the Interior and the Governor of Utah for resolution.

NOV 7 1977
Date

Associate Utah State Director
Bureau of Land Management
Department of the Interior

November 9, 1977
Date

Utah State Historic
Preservation Officer

APPENDIX IV
Land Use Planning

Range Suitability Criteria and Standards. The Range staff of BLM Denver Service Center has developed a basic range suitability guide to aid field personnel of BLM in adjusting grazing capacities and the amount of suitable range available for grazing by domestic livestock, while bearing in mind the various aspects of the plant-soil environment. These Range Suitability Criteria and Standards are founded on as many reputable sources of research information as possible in four parameters of major influence (productivity, slope, distance from water, and soil erosion).

The Forest Service, in analyzing rangelands, uses the term "suitability" to define land adaptable to livestock use. Suitable range means forage-producing land, which can be grazed on a sustained-yield basis under an attainable management system without damage to the basic soil resource of the specific or adjacent areas. This term is often confused with the common term "usable". Many areas can be grazed by livestock and are, therefore, usable, but they cannot be grazed year after year without damage to the soil resource. Thus, ranges that can be grazed by livestock can be called usable, but may not be suitable because of the resulting damage to the sites. Ranges are suitable only if they can be grazed on a sustained-yield basis without damage to the basic soil resource (Forest Service Handbook, 1964).

The Range Suitability Criteria and Standards are arranged in table 1-1. Figure 1-1 is a graph of the relationship of slope versus distance based on the table in the key.

Each individual office can adapt or adjust the key, within certain limits, to specific unique management situations. A suitability guide for Cedar City District has been prepared.

Adjustments for specific standards to specific allotments would occur at the most limiting parameter of influence that would most affect the Suitability Criteria (Brady, 1974; Odum, 1971; Stoddart et al., 1975).

It is not anticipated that rangelands identified as "unsuitable" for grazing would be fenced and all grazing prohibited except in unusual special conditions where threatened and endangered species, very critical wildlife habitat, and scenic beauty necessitate fencing as the only means of providing protection. Rather, unsuitable rangelands would not be given carrying capacity for domestic livestock. Additionally, no range improvements, e.g., water developments would be located in unsuitable areas and no management actions e.g., salting would be taken which deliberately attract grazing animals into unsuitable rangelands.

TABLE 1

Range Suitability Guidelines for Cedar City District, BLM

1.	Service area of water is greater than 3 miles (flat terrain)	PS
2.	If service area of water is less than 3 miles, then a or b:	
	a. Current and/or potential production of usable perennial forage is less than 16 pounds per acre (capacity is less than 50 acres per AUM)	U
or	b. Current and/or potential production of usable perennial forage is greater than 16 pounds per acre (capacity is greater than 50 acres per AUM)	S
3.	If Soil Surface Factor (SSF) is 60 or greater, then a or b:	
	a. Potential to reduce SSF through proper livestock management is less than 10 percent.	U
or	b. Potential to reduce SSF through proper livestock management is greater than 10 percent within 20 years.	PS
4.	If SSF is less than 60, then a or b:	
	a. If SSF is 40 to 60, then 1 or 2:	
	1. Slope is greater than 20 percent	U
or	2. Slope is less than 20 percent	S
	b. If SSF is less than 40, see table below.	

Slope Percent	Distance Up Slope	Suitable	Unsuitable
0-20%	to 4 miles	X	...
21-30%	to 0.6 miles	X	...
	over 0.6 miles	...	X
31-40%	to 0.4 miles	X	...
	over 0.4 miles	...	X
41-50%	to 0.3 miles	X	...
	over 0.3 miles	...	X
greater than 51% slope		...	X

PS = Potentially U = Unsuitable S = Suitable

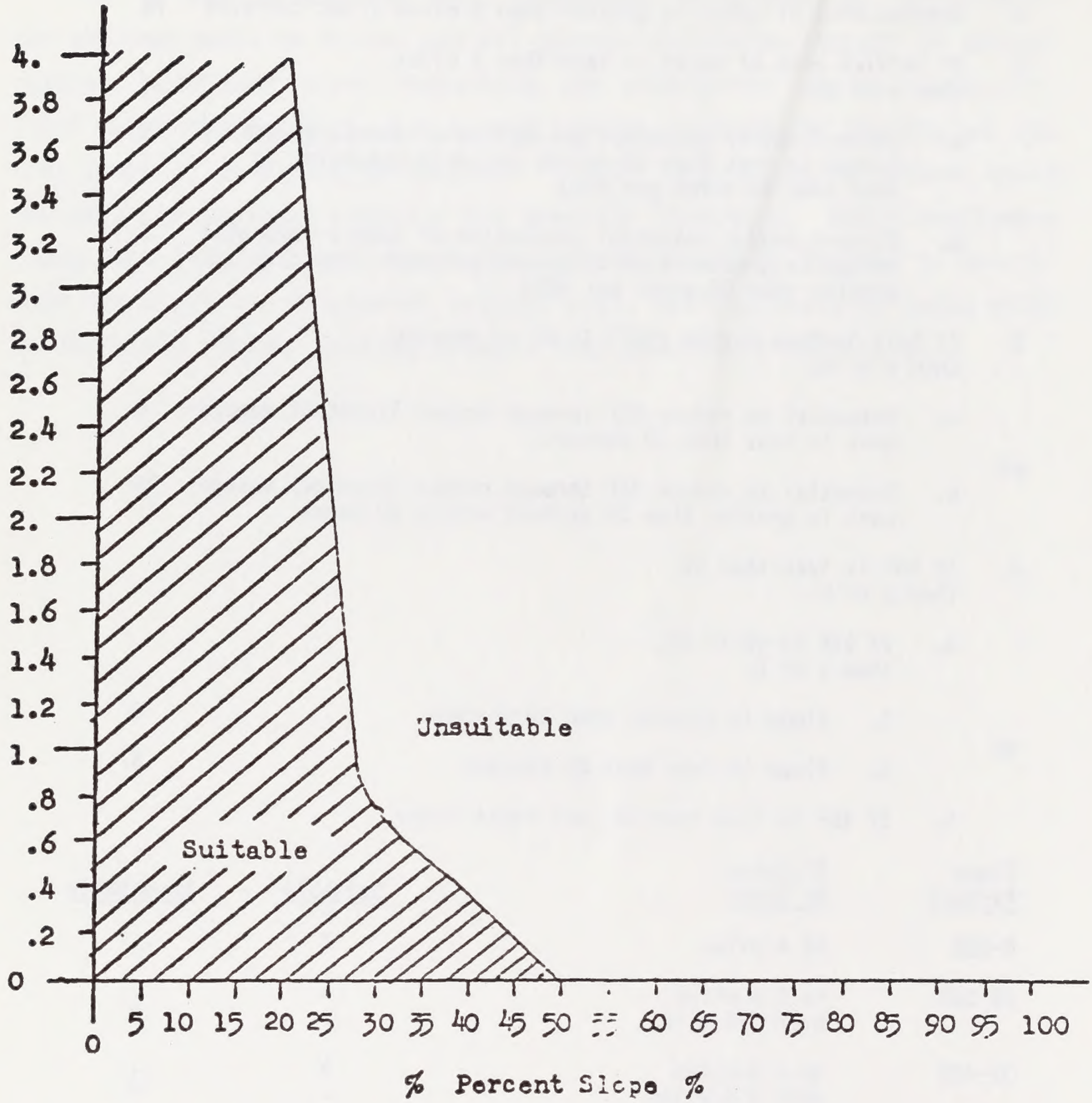


FIGURE 1

Relationship of Slope and Distance Up Slope (or from water) Which Indicates Suitable/Unsuitable Grazing Land

APPENDIX V

Soil Associations

Allotment	Total Acres	Tobler-Harrisburg-Junction	Winkel Rock Land	Pintura-Toquerville-Duneland	Cave	Badland-Eroded Land	Bond-Rock Land	Rock Land-Mathis	Rock Outcrop-Rock Land
INTENSIVE MANAGEMENT									
Alger Hollow									
Alger Hollow	8,800	......	176	......	......	......	......	......	5,280
Diamond Valley	1,730	......	......	......	......	......	......	......	......
Wide Canyon	6,250	......	......	......	......	......	......	......	......
Sand Wash	7,000	......	......	......	......	......	......	......	4,410
Apex Slope									
Apex Slope	5,879	......	2,352	......	......	......	......	......	......
Beaver Dam Slope									
Santa Clara/ Beaver Dam Slope	35,030	......	......	......	25,321	......	......	......	......
Indian Springs	21,400	......	......	......	11,342	......	......	......	......
Castle Cliffs	12,060	......	......	......	4,023	......	......	......	7,441
Big Mountain									
Big Mountain	9,126	......	......	......	......	......	......	......	......
Boomer Hill									
Boomer Hill	940	385	......	......	......	......	......	......	555
Cove Wash	3,387	1,829	779	......	......	......	......	......	779
Boot Spring									
Boot Spring	2,118	......	......	......	......	211	......	1,907	......
Bull Mountain									
Bull Mountain	14,519	......	......	......	958	......	......	......	......
Central									
Central	2,920	......	......	......	......	......	......	......	......
Coalpits & Fault[a]									
Coalpits	2,525	......	......	......	......	505	......	505	......
Fault	785	......	......	......	......	322	......	......	......
Cougar Canyon									
Cougar Canyon	9,150	......	......	......	......	......	......	......	......
Curly Hollow									
Curly Hollow	22,972	......	2,297	......	......	14,014	......	......	2,297
Dagget Flat									
Dagget Flat	4,127	......	......	......	......	......	......	......	......

[a]Custodial management included in intensive management allotments.

(continued)

Source: Soil associations interpreted from SCS Washington County Soil Survey (unpublished).

APPENDIX V (continued)

Allotment	Naplene-Redbank-Schmutz	Mespun-Rock Land	Curhollow-Pastura-Magotsu	Motoqua-Quazo-Dagflat	Welring-Tortugas-Rock Outcrop	Collbran-Tacan-Nehar	Paunsaugunt-Kolob-Dalcan	Barkerville-Gaddes-Rock-Outcrop	Anthony-Vinton-Aqua
Alger Hollow									
Alger Hollow	......	......	3,344	......	......	......	......	......	......
Diamond Valley	......	......	1,089	......	......	641	......	......	......
Wide Canyon	500	......	3,937	......	......	1,813	......	......	......
Sand Wash	1,190	......	1,400	......	......	......	......	......	......
Apex Slope									
Apex Slope	......	......	3,527	......	......	......	......	......	......
Beaver Dam Slope									
Santa Clara/ Beaver Dam Slope	......	......	......	5,080	4,629	......	......	......	......
Indian Springs	......	......	......	4,708	4,068	......	1,282	......	......
Castle Cliffs	......	......	596	......	......	......	......	......	......
Big Mountain									
Big Mountain	......	......	......	9,126	......	......	......	......	......
Boomer Hill									
Boomer Hill	......	......	......	......	......	......	......	......	......
Cove Wash	......	......	......	......	......	......	......	......	......
Boot Spring									
Boot Spring	......	......	......	......	......	......	......	......	......
Bull Mountain									
Bull Mountain	......	......	......	13,358	203	......	......	......	......
Central									
Central	......	......	1,752	......	......	1,168	......	......	......
Coalpits and Fault[a]									
Coalpits	1,515	......	......	......	......	......	......	......	......
Fault	463	......	......	......	......	......	......	......	......
Cougar Canyon									
Cougar Canyon	......	......	......	9,150	......	......	......	......	......
Curly Hollow									
Curly Hollow	......	......	4,364	......	......	......	......	......	......
Dagget Flat									
Dagget Flat	......	......	......	4,127	......	......	......	......	......
Desert Inn									
Desert Inn	......	......	2,908	14,659	5,386	1,479	......	......	......
Dome									
Dome	......	......	......	......	......	......	......	......	......
Warner Valley	......	......	......	......	......	......	......	......	......

[a]Custodial management included in intensive management allotments.

(continued)

APPENDIX V (continued)

Allotment	Total Acres	Tobler-Harrisburg-Junction	Winkel Rock Land	Pintura-Toquerville-Duneland	Cave	Badland-Eroded Land	Bond-Rock Land	Rock Land-Mathis	Rock Outcrop-Rock Land
Desert Inn									
Desert Inn	36,983	......	......	......	5,547	2,502	......	4,502	......
Dome									
Dome	2,188	1,422	153	......	......	613	......	......	......
Warner Valley	880	123	......	......	......	757	......	......	......
Fort Pierce									
Fort Pierce, UT	9,209	1,658	......	3,039	......	1,749	......	......	2,763
Fort Pierce, AZ	13,818	......	......	......	......	......	......	......	......
Spendlove	7,654	5,664	......	......	......	1,225	......	......	765
Gooseberry									
Gooseberry	4,440	......	......	......	......	......	......	4,440	......
Grafton									
Grafton	7,258	......	......	......	......	3,048	435	3,775	......
Gunlock									
Gunlock	6,334	......	......	......	......	......	......	......	2,787
Herd House[a]									
Herd House	2,870	1,952	......	......	......	574	......	......	344
Hurricane[a]									
Hurricane	2,070	2,029	41	......	......	......	......	......	......
Hurricane Fault									
Eagle	1,595	......	......	......	......	......	319	989	......
Terrace	4,358	......	......	......	......	1,350	......	524	......
Frog Hollow	2,605	......	......	......	......	......	......	......	573
Workman Wash	1,988	......	......	......	......	......	......	......	676
Gould	8,300	......	......	......	......	2,075	......	1,328	......
Gould Ranch	580	......	......	......	......	......	......	......	......
Hurricane Mesa[a]									
Hurricane Mesa	6,811	......	......	......	......	1,634	2,247	2,726	......
Jackson Wash									
Jackson Wash	28,680	......	......	......	6,022	4,015	......	......	2,008
Land Hill									
Land Hill	1,030	......	907	......	......	123	......	......	......
Little Creek									
Little Creek	14,595	......	......	......	......	......	12,796	1,112	......
Mesa[a]									
Mesa	2,580	......	......	......	......	1,135	258	1,187	......

[a]Custodial management included in intensive management allotments.

(continued)

Allotment	Naplene-Redbank-Schmutz	Mespun-Rock Land	Curhollow-Pastura-Magotsu	Motoqua-Quazo-Dagflat	Welring-Tortugas-Rock Outcrop	Collbran-Tacan-Nehar	Paunsaugunt-Kolob-Dalcan	Barkerville-Gaddes-Rock-Outcrop	Anthony-Vinton-Aqua
Fort Pierce									
Fort Pierce, UT	......	......	......	......	......	......	......	......	......
Fort Pierce, AZ	......	......	......	......	......	......	......	4,974	8,844
Spendlove	......	......	......	......	......	......	......	......	......
Gooseberry									
Gooseberry	......	......	......	......	......	......	......	......	......
Grafton									
Grafton	......	......	......	......	......	......	......	......	......
Gunlock									
Gunlock	......	1,710	1,013	......	......	824	......	......	......
Herd House[a]									
Herd House	......	......	......	......	......	......	......	......	......
Hurricane[a]									
Hurricane	......	......	......	......	......	......	......	......	......
Hurricane Fault									
Eagle	287	......	......	......	......	......	......	......	......
Terrace	174	......	2,310	......	......	......	......	......	......
Frog Hollow	703	......	1,329	......	......	......	......	......	......
Workman Wash	......	......	1,312	......	......	......	......	......	......
Gould	4,897	......	......	......	......	......	......	......	......
Gould Ranch	......	......	580	......	......	......	......	......	......
Hurricane Mesa[a]									
Hurricane Mesa	204	......	......	......	......	......	......	......	......
Jackson Wash									
Jackson Wash	......	860	9,752	1,147	4,876	......	......	......	......
Land Hill									
Land Hill	......	......	......	......	......	......	......	......	......
Little Creek									
Little Creek	......	......	......	......	......	687	......	......	......
Mesa[a]									
Mesa	......	......	......	......	......	......	......	......	......
Minera Wash									
Minera Wash	......	......	3,107	......	......	......	......	......	......
Red Cliffs									
Red Cliffs	......	......	......	......	......	......	......	......	......
Silver Reef	......	491	......	......	......	......	......	......	......
Leeds	......	......	......	......	......	......	......	......	......

[a]Custodial Management included in intensive management allotments.

(contnued)

APPENDIX V (continued)

Allotment	Total Acres	Tobler-Harrisburg-Junction	Winkel Rock Land	Pintura-Toquerville-Duneland	Cave	Badland-Eroded Land	Bond-Rock Land	Rock Land-Mathis	Rock Outcrop-Rock Land
Minera Wash									
Minera Wash	4,637	......	......	......	......	......	......	......	1,530
Red Cliffs									
Red Cliffs	10,144	812	2,637	......	......	2,637	......	......	4,058
Silver Reef	1,170	......	......	......	......	......	......	......	679
Leeds	2,643	......	1,401	......	......	343	......	......	899
Sand Mountain									
Sand Mountain Spring	1,930	1,679	......	251	......	......	......	......	......
Sand	5,155	1,443	......	3,352	......	360	......	......	......
Sand Mountain	14,000	1,960	700	10,640	......	......	......	......	700
Sandstone Mountain									
Sandstone Mountain	2,531	......	1,267	303	......	227	......	......	......
Santa Clara Creek									
Santa Clara Creek	3,038	......	516	30	......	2,492	......	......	......
Scarecrow Peak[a]									
Catclaw	3,410	......	......	......	3,410	......	......	......	......
Terry	10,350	......	......	......	10,350	......	......	......	......
Beaver Dam Wash	26,862	......	......	......	24,982	......	......	......	......
Snow Holding Pasture	3,495	......	......	......	......	......	......	......	350
Short Creek									
Canaan Gap	2,616	......	......	......	......	......	125	1,131	......
Canyon	581	......	......	......	......	......	139	147	......
Short Creek	1,983	......	......	......	......	......	194	425	......
Smith Mesa									
Smith Mesa	1,940	......	......	......	......	......	......	407	......
Toquerville									
Pintura	2,481	......	......	......	......	372	......	......	1,265
Ash Creek	1,839	......	......	184	......	......	......	......	......
LaVerkin	2,021	......	......	......	......	1,576	......	......	182
Toquerville	4,734	......	......	......	......	3,409	......	......	1,136
Trail									
Trail	3,220	......	......	......	......	1,965	......	128	......
Twin Peaks									
Twin Peaks	28,836	......	......	......	......	4,325	......	......	3,460
Veyo									
Veyo	8,056	......	......	......	......	......	......	......	2,981

[a]Custodial management included in intensive management allotments.

(continued)

APPENDIX V (continued)

Allotment	Naplene-Redbank-Schmutz	Mespun-Rock Land	Curhollow-Pastura-Magotsu	Motoqua-Quazo-Dagflat	Welring-Tortugas-Rock Outcrop	Collbran-Tacan-Nehar	Paunsaugunt-Kolob-Dalcan	Barkerville-Gaddes-Rock-Outcrop	Anthony-Vinton-Aqua
Sand Mountain									
Sand Mountain Spring	......	......	......	......	......	......	......	......	......
Sand	......	......	......	......	......	......	......	......	......
Sand Mountain	......	......	......	......	......	......	......	......	......
Sandstone Mountain									
Sandstone Mountain	......	734	......	......	......	......	......	......	......
Santa Clara Creek									
Santa Clara Creek	......	......	......	......	......	......	......	......	......
Scarecrow Peak[a].									
Catclaw	......	......	......	......	......	......	......	......	......
Terry	......	......	......	......	......	......	......	......	......
Beaver Dam Wash	......	......	......	1,880	......	......	......	......	......
Snow Holding Pasture	......	......	3,145	......	......	......	......	......	......
Short Creek									
Canaan Gap	1,360	......	......	......	......	......	......	......	......
Canyon	295	......	......	......	......	......	......	......	......
Short Creek	1,364	......	......	......	......	......	......	......	......
Smith Mesa									
Smith Mesa	1,533	......	......	......	......	......	......	......	......
Toquerville									
Pintura	99	......	......	......	......	745	......	......	......
Ash Creek	......	790	865	......	......	......	......	......	......
LaVerkin	......	......	263	......	......	......	......	......	......
Toquerville	......	......	189	......	......	......	......	......	......
Trail									
Trail	......	......	1,127	......	......	......	......	......	......
Twin Peaks									
Twin Peaks	......	......	8,653	3,460	2,595	6,343	......	......	......
Veyo									
Veyo	......	241	4,834	......	......	......	......	......	......
Virgin[a]									
Virgin	97	......	148	......	......	......	......	......	......
Mountain Dell	......	......	......	......	......	......	......	......	......
Warner Ridge									
Warner Ridge	......	......	......	......	......	......	......	......	......

[a]Custodial management included in intensive management allotments.

(continued)

APPENDIX V (continued)

Allotment	Total Acres	Tobler-Harrisburg-Junction	Winkel Rock Land	Pintura-Toquerville-Duneland	Cave	Badland-Eroded Land	Bond-Rock Land	Rock Land-Mathis	Rock Outcrop-Rock Land
Virgin[a]									
Virgin	4,890	......	......	......	......	4,645	......	......	......
Mountain Dell	1,600	......	......	......	......	1,600	......	......	......
Warner Ridge									
Warner Ridge	1,884	716	......	......	......	1,168	......	......	......
Washington									
Washington	9,765	......	......	......	......	......	......	......	7,714
White Dome[a]									
White Dome	2,507	1,754	......	......	......	753	......	......	......
SUB TOTAL	505,862	23,426	13,226	17,799	91,955	61,724	16,513	25,233	55,632
CUSTODIAL									
Airport									
Airport	147	147	......	......	......	......	......	......	......
Black Canyon									
Black Canyon	600	......	......	......	......	108	......	228	......
Box Canyon									
Box Canyon	659	......	540	......	......	......	......	......	119
Cinder Mountain									
Cinder Mountain	2,240	......	......	......	......	......	1,994	......	......
Dalton Wash	855	......	......	......	......	522	......	......	......
Lamoreaux									
Lamoreaux	160	......	......	......	......	80	......	......	......
Little Plain									
Little Plain	930	......	......	......	......	......	437	456	......
North Grafton									
Grafton	500	......	......	......	......	......	......	......	......
Red Butte									
Red Butte	894	......	......	......	......	510	......	......	384
Rock Springs									
Rock Springs	820	......	......	......	......	......	307	205	......
Sand Hills									
Sand Hills	992	......	......	992	......	......	......	......	......

[a]Custodial management included in intensive management allotments.

(continued)

APPENDIX V (continued)

Allotment	Naplene-Redbank-Schmutz	Mespun-Rock Land	Curhollow-Pastura-Magotsu	Motoqua-Quazo-Dagflat	Welring-Tortugas-Rock Outcrop	Collbran-Tacan-Nehar	Paunsaugunt-Kolob-Dalcan	Barkerville-Gaddes-Rock-Outcrop	Anthony-Vinton-Aqua
Washington Washington	......	......	2,051	......	......	......	......	......	......
White Dome[a] White Dome	......	......	......	......	......	......	......	......	......
SUB TOTAL	14,681	4,826	63,595	66,695	21,757	13,700	1,282	4,974	8,844
CUSTODIAL									
Airport Airport	......	......	......	......	......	......	......	......	......
Black Canyon Black Canyon	264	......	......	......	......	......	......	......	......
Box Canyon Box Canyon	......	......	......	......	......	......	......	......	......
Cinder Mountain Cinder Mountain	246	......	......	......	......	......	......	......	......
Dalton Wash Dalton Wash	333	......	......	......	......	......	......	......	......
Lamoreaux Lamoreaux	80	......	......	......	......	......	......	......	......
Little Plain Little Plain	37	......	......	......	......	......	......	......	......
North Grafton Grafton	500	......	......	......	......	......	......	......	......
Red Butte Red Butte	......	......	......	......	......	......	......	......	......
Rock Springs Rock Springs	308	......	......	......	......	......	......	......	......
Sand Hills Sand Hills	......	......	......	......	......	......	......	......	......
Sand Wash Reservoir Sand Cove	......	......	640	......	......	......	......	......	......

[a]Custodial management included in intensive management allotments.

(continued)

APPENDIX V (continued)

Allotment	Total Acres	Tobler-Harrisburg-Junction	Winkel Rock Land	Pintura-Toquerville-Duneland	Cave	Badland-Eroded Land	Bond-Rock Land	Rock Land-Mathis	Rock Outcrop-Rock Land
Sand Wash Reservoir									
Sand Cove	640	......	......	......	......	......	......	......	......
Stout									
Stout	235	......	......	......	......	......	......	228	......
Yellow Knolls									
Yellow Knolls	525	......	......	......	......	......	......	......	525
SUB TOTAL	10,197	147	540	992	0	1,220	2,738	1,117	1,028
ELIMINATION OF GRAZING									
LaVerkin Creek									
LaVerkin Creek	10,716	......	......	......	......	6,108	......	......	332
Pace Knoll									
Pace Knoll	1,885	......	......	......	......	......	......	......	......
Pintura Seeding									
Pintura	904	......	......	......	......	......	......	......	......
SUB TOTAL	13,505	0	0	0	0	6,108	0	0	322
TOTAL	529,564	23,573	13,766	18,791	91,955	69,052	19,251	26,350	56,982

[a]Custodial management included in intensive management allotments.

(continued)

APPENDIX V (concluded)

Allotment	Naplene-Redbank-Schmutz	Mespun-Rock Land	Curhollow-Pastura-Magotsu	Motoqua-Quazo-Dagflat	Welring-Tortugas-Rock Outcrop	Collbran-Tacan-Nehar	Paunsaugunt-Kolob-Dalcan	Barkerville-Gaddes-Rock-Outcrop	Anthony-Vinton-Aqua
Stout									
Stout	7	......	......	......	......	......	......	......	......
Yellow Knolls									
Yellow Knolls	......	......	......	......	......	......	......	......	......
SUB TOTAL	1,775	0	640	0	0	0	0	0	0
ELIMINATION OF GRAZING									
LaVerkin Creek									
LaVerkin Creek	......	......	535	......	......	3,751	......	......	......
Pace Knoll									
Pace Knoll	......	......	......	......	......	1,885	......	......	......
Pintura Seeding									
Pintura	......	......	......	......	......	904	......	......	......
SUB TOTAL	0	0	535	0	0	6,540	0	0	0
TOTAL	16,456	4,826	64,770	66,695	21,757	20,240	1,282	4,974	8,844

[a]Custodial management included in intensive management allotments.

APPENDIX VI

Evaluation Methods - Soil Erosion, Washington County

Current erosion rates in Washington County were estimated using a method developed by the Water Management Subcommittee of the Pacific Southwest Interagency Committee (PSIC). Nine separate factors were evaluated to determine current sediment yield. The factors evaluated were: surface geology, soils, climate, runoff, topography, ground cover, land use, upland erosion, and channel erosion and sediment transport.

Samples were taken at 155 separate locations by Bureau of Land Management (BLM) field crews as part of a watershed inventory conducted in the fall of 1975. For that portion of the area in Arizona, erosion rates were estimated using a method developed by the BLM Denver Service Center. The factors used in the evaluation were: soil texture, precipitation, rooting depth, bare ground, utilization of vegetation, present erosion class (soil surface factor), and severity of gullying.

These factors were assigned numbers corresponding to those on the data sheet developed by the PSIC. Erosion rates in acre-feet per square mile per year were then taken from the PSIC form. These erosion rates were compared with actual sediment yield data collected by SCS at ten locations in a variety of sediment yielding areas. Where the two methods of calculating sediment yield did not compare favorably, the PSIC method was adjusted to agree with the actual measurements of SCS.

In order to predict the effect of the proposal on the current sediment yield, the impacts described in table 3-1 were projected on the existing erosion condition as shown on table 2-5. Acreages within a given erosion potential were tabulated by impact (positive, negative, no change). It is logical to assume that if a particular allotment was impacted negatively, for example, the resulting influence on sediment yield would depend on the erosion susceptibility of the allotment. A negative impact to an allotment containing a high proportion of soils with a slight potential to erode would not be as significant as a

negative impact on an allotment that is highly susceptible to erosion. Basically, current erosion rates would be reduced by positive impacts and increased by negative impacts.

The Universal Soil Loss Equation (SCS, 1976) can be used to estimate the gross movement of soil that occurs from sheet and rill erosion. Other forms of erosion (gully, streambank) cannot be determined by this equation. As used in the context of this analysis, a more important function of the equation is to identify the variables affecting erosion, show their relationship to one another, and indicate the extent to which they can be manipulated by management. Factors can be adjusted to see what effect various management and conservation practices would have on soil loss.

The complete Universal Soil Loss Equation (USLE) is: A = RKLSCP

Where A is the computed soil loss (sheet and fill erosion) in tons per acre per year;

R the rainfall factor, is the number of erosion - index unit computed from the characteristics of rainfall during a normal year, for a given geographical area;

K the soil erodibility factor, is the erosion rate per unit of erosion - index for a specific soil in cultivated continuous fallow, on a 9-percent slope 72.6 feet long;

L the slope - length factor, is the ratio of the soil loss from the field slope length to that from a 72.6 feet length on the same soil type and gradient;

S the slope - gradient factor, is the ratio of soil loss from the field gradient to that from a 9-percent slope;

C the cropping management factor, is the ratio of soil loss from a field with specified cropping and management, or type of

vegetative cover to that from the fallow condition on which the K factor is evaluated;

P the erosion - control practice factor, is the ratio of soil loss with contouring, stripcropping or terracing to that with straight-row farming, up-and-down slope (generally applies only to cropland).

Management decisions generally influence erosion losses by changes in the C and P factors in the USLE. The L factor is modified by terracing. The other three factors, R, K, and S, are fixed for a given location.

A calculation of the equation for a hypothetical area that is typical of the Hot Desert shows:

Universal Soil Loss Equation A = RKSSCP

Where

R = 25; factor obtained for Hot Desert Area Universal Soil Loss Equation SCS, 1976.

K = .18; factor obtained for average soil in Hot Desert using soil association information by allotment (Appendix V) and Soil Erodibility and Soil Loss Factors for Utah Soils SCS, 1977.

LS = G.16; factor obtained from SCS, 1976. Assumes an arbitrary 30-percent slope with a length of 60 feet.

C = .28; factor obtained from SCS, 1976. Assumes an arbitrary canopy consisting of low brush with a canopy cover of 25 percent and a ground cover of 10 percent.

P = 1.0; factor obtained from SCS, 1976. Assumes no cross-slope type erosion practices such as contour stripping.

A = 7.76 tons per acre per year or converted to acre-feet per square mile per year (similar to table 2-5) is 2.07.

In the event the proposal effects a 10-percent increase in ground cover on this hypothetical area, the C value would be reduced to .20. The sediment yield (A) would be reduced to 5.5 tons per acre per year or 1.47 acre-feet per square mile per year.

In this illustration, a 28-percent decrease in the erosion rate would occur. In actuality, a smaller increase would probably be realized since there is a high degree of variability between sites in the Hot Desert and each would respond differently to an increase in ground cover.

The other factors considered in the Universal Soil Loss Equation have a more pronounced effect on soil loss. For example, soil loss for the sample calculation was 7.76 tons per acre per year. If the site would have a slope gradient of 40 percent (rather than 30 percent), the soil loss would be near 12.35 tons per acre per year, an increase of 37 percent.

APPENDIX VII
Description of Vegetative Types

Desert Shrub. The desert shrub type occurs on low elevations and in low rainfall areas. Desert shrub vegetation is found on all 17 soil associations identified by SCS in this area. Soil textures range from silty clay loam to very stony sandy loam.

The dominant plant species is blackbrush (*Coleogyne ramosissima*). This species may vary from 25 to near 100 percent of the composition where it occurs. In the lower elevations near the Arizona border, it is often found with bursage (*Franseria dumosa*) as a codominant species. Typical percent composition is as follows:

Perennial Grass	8 percent
Shrubs	70 percent
Forbs and Annuals	22 percent

Usable livestock forage is desired from the associated species within this type such as Brigham tea (*Ephedra sp.*), winter fat (*Eurotia lanata*), bursage, galleta grass (*Hilaria jamesii*), sand dropseed (*Sporobolus sp.*), Indian ricegrass (*Oryzopsis hymenoides*), blackbrush, and annual grass and forbs. In addition to these species, wildlife forage is provided by desert almond (*Prunus fasciculata*). This type is important to quail, small mammals, and birds. The plant vigor of desirable forage species in this type is generally poor and ground cover ranges between 5 to 30 percent.

Pinyon-juniper. The pinyon-juniper type generally occurs in mid-elevation areas between the desert and mountain zones. At low elevations and in areas where rainfall is low, juniper trees (*Juniperus* sp.) are more dominant and often occur without pinyon trees (*Pinus* sp.). However, as the rainfall and elevation increase, the occurrence of pinyon trees increases. This type occurs on undulating-to-steep mountain topography and can be found throughout the area. The soil texture ranges from loamy fine sand to very stony sandy loam and soils are typically shallow.

This type is generally associated with low-growing shrubs. Species composition is variable between sites but generally at lower elevations. Mohave Desert Ceanothus (Ceanothus greggii), live oak (Quercus turbinella), and blackbrush are common. Higher elevations near Dixie National Forest and Zion National Park are characterized by big sagebrush (Artemisia tridentata), antelope bitterbrush (Purshia tridentata), cliffrose (Cowania stansburiana), Utah serviceberry (Amelanchier utahensis), and mountain mahogany (Cercocarpus montanus). Perennial grasses such as desert needlegrass (Stipa speciosa), squirreltail grass (Sitanion hystrix) and muttongrass (Poa fendleriana) are found at variable elevations throughout this type. These understory species provide forage for wildlife and livestock and the dominant pinyon-juniper overstory provides cover for wildlife. This type is important for deer.

Typical percent composition is as follows:

Perennial Grass	5 percent
Shrubs and Trees	80 percent
Forbs and Annuals	15 percent

The vigor of the desirable forage species in this type is fair; ground cover varies between 10 to 30 percent.

Sagebrush. The sagebrush type is scattered throughout the area and is normally found in higher rainfall areas. It occurs in pure stands or can be mixed with other shrubs and grasses. Sagebrush extends into the pinyon-juniper zone at higher elevations. Big sagebrush is one of the dominant species. Another species, sandsage (Artemisia filifolia) is locally dominant in areas of sandy soil such as Sand Mountain. The soil texture ranges from silty clay loam to very stony sandy loam. Other species that provide forage for livestock include Indian ricegrass, sand dropseed, and Brigham tea. The sagebrush, perennial grass, Brigham tea, and forbs are valuable wildlife forage and the type as a whole is important for cover to deer, quail, small mammals and birds.

Typical percent composition is as follows:

Perennial Grass	15 percent
Shrubs	73 percent
Forbs and Annuals	12 percent

The vigor of the desirable forage species in this type is fair to poor; and ground cover varies from 15 to 24 percent.

Joshua Tree. The extent of this type is limited to the southwest corner of the county at low elevations. The Joshua tree (*Yucca brevifolia*) grows in open groves at the upper limits of the creosote bush (*Larrea tridentata*) type and is endemic to the Mohave Desert biome. This type occurs on well-drained alluvial soils that can range in depth and texture. Most livestock and wildlife forage is supplied by shrubs that are found in the desert shrub and creosote bush types but composition is variable as it depends on the amount of Joshua tree and creosote bush present. Perennial grasses such as Indian ricegrass and bush muhly (*Muhlenbergia porteri*) and annuals that include fillaree (*Erodium cicutarium*) also provide forage to livestock and wildlife. This type is important to quail, small mammals, birds, and reptiles. Areas within this type are also habitat for the Desert tortoise.

General percent composition is as follows:

Perennial Grass	4 percent
Shrubs and Trees	76 percent
Forbs and Annuals	20 percent

The vigor of the desirable forage species in this type is poor to fair; ground cover varies between 5 to 15 percent.

Creosote Bush. The creosote bush type occurs at low elevations and in low precipitation areas. The dominant shrub, creosote bush, sometimes occurs in extensive, nearly pure stands on broad alluvial fans and flats. The type generally occurs in the southern half of the area. Short-lived annual vegetation flourishes in the spring when precipitation is ample. Forage is limited in this type, but annuals such as brome grass (*Bromus* sp.) and fillaree and shrubs such as bursage, Brigham tea, range ratany (*Krameria parvifolia*) and indigo bush (*Dalea fremontii*) provide forage for wildlife and livestock. This type is important habitat for quail, small mammals, and birds.

Typical percent composition is as follows:

Perennial Grass	5 percent
Shrubs	70 percent
Forbs and Annuals	25 percent

The vigor of the desirable forage species in this type is fair to poor; percent ground cover varies between 5 to 15 percent. The soil texture varies as does soil depth.

Grass. The grass type occurs at mid-elevations in areas where precipitation and soils are favorable. There are small areas of native galleta grass south of the Little Creek Mountain. Big galleta grass (*Hilaria rigida*) is also found in areas south of Washington. Other grass areas identified on the map are seeded areas with crested wheat-grass (*Agropyron desertorum*) being the most important species. These areas supply substantial amounts of livestock forage but are limited in their extent. The grass type supplies forage to wildlife and shrubs within this type provide cover.

The typical percent composition is as follows:

Perennial Grass	50 percent
Shrubs	30 percent
Forbs and Annuals	20 percent

The vigor of the desirable forage species in this type is poor to fair. The percent ground cover varies between 18 to 25 percent.

Half Shrub. This type occupies relatively small areas at mid-elevations; rainfall varies. The half shrub type is located mainly in valley bottoms and in areas accessible to livestock. The dominant species is snakeweed (*Gutierrezia sarothrae*) with little rabbitbrush (*Chrysothamnus viscidiflorus* and *stenophyllus*) being codominant in certain areas. Associated vegetation is similar to that found in other vegetative types with the composition varying with the degree of invasion by the species noted above. Livestock and wildlife forage is provided by the smaller amounts of desirable shrubs and perennial grasses found in this type. Annuals and forbs are also important forage sources when they are abundant. This type is important habitat for

quail, small mammals, and birds. This type is found on a wide range of soils and occurs where plants are heavily grazed.

The typical composition in percent is as follows:

Perennial Grass	15 percent
Shrubs	65 percent
Forbs and Annuals	20 percent

The vigor of the desirable forage species in this type is fair to poor and the percent ground cover varies between 8 to 20 percent.

Saltbush. The extent of this vegetative type is quite small and occurs in the White Hills area west of Bloomington, Utah and other small areas located near the Fort Pierce and Canaan Gap areas. This type is found at low elevations. The dominant species is shadscale (Atriplex confertifolia) although fourwing saltbush (Atriplex canescens) is associated with this type. The saltbush type is found on erosive soils and in areas where ground cover is 5 to 10 percent.

The typical composition in percent is as follows:

Perennial Grass	5 percent
Shrubs	70 percent
Forbs and Annuals	25 percent

The vigor of the desirable forage species in the saltbush type is poor. Although desirable forage species for livestock are found in this type, they do not cover extensive areas. Cover for wildlife is limited, but shrubs such as shadscale, fourwing saltbush, and Brigham tea provide food. When abundant, annuals and forbs are also important.

Annuals. Although annual plants are found in every vegetative type, predominant annual vegetation is limited in extent and large areas are found south of Shivwits as a result of a range fire many years ago. Principal species include cheatgrass (Bromus tectorum), red brome (Bromus rubens), and Russian thistle (Salsola kali). The forage production of this type is variable and depends on adequate moisture. These annuals are important for wildlife, but cover is limited in this type.

Typical vegetation composition in percent is as follows:

Perennial Grass	10 percent
Shrubs	20 percent
Forbs and Annuals	70 percent

The vigor of the desirable forage species in this type is poor; percent ground cover varies between 5 to 15 percent. Soil depth is typically shallow.

APPENDIX VIII

Forage Condition

Allotment			Livestock Forage Condition (Suitable Acreage)				Forage Production (AUM)	
	Public Land Acres							
Name	(Total)	(Unsuitable)	Poor	Fair	Good	Apparent Trend	Livestock	Wildlife
Alger Hollow	......	......	......	......	.....	......	.....	1,111
Alger Hollow	8,800	2,280	3,310	3,210	0	Down	284	.....
Diamond Valley	1,730	0	1,730	0	0	Down	84	.....
Wide Canyon	6,250	0	5,210	1,040	0	Down	263	.....
Sand Wash	7,000	3,910	1,280	1,810	0	Down	140	.....
Apex Slope	......	......	......	......	.....	......	.....	130
Apex Slope	5,879	400	273	5,206	0	Down	346	.....
Beaver Dam Slope	......	......	......	......	.....	......	.....	1,626
Santa Clara Slope/Beaver Dam Slope	35,030	1,910	17,553	15,567	0	Down	1,179	.....
Indian Springs	21,400	1,940	10,314	9,146	0	Down	889	.....
Castle Cliffs	12,060	1,809	5,427	4,824	0	Down	418	.....
Big Mountain	......	......	......	......	.....	......	.....	810
Big Mountain	9,126	2,873	2,751	3,502	0	NA	319	.....
Boomer Hill	......	......	......	......	.....	......	.....	89
Boomer Hill	940	0	310	630	0	NA	28	.....
Cove Wash	3,387	605	918	1,864	0	NA	104	.....
Boot Spring	......	......	......	......	.....	......	.....	90
Boot Spring	2,118	453	1,665	0	0	NA	59	.....

[a]Custodial management included in intensive management allotments.
NA = Not available

(continued)

APPENDIX VIII (continued)

Allotment			Livestock Forage Condition (Suitable Acreage)				Forage Production (AUM)	
	Public Land Acres					Apparent		
Name	(Total)	(Unsuitable)	Poor	Fair	Good	Trend	Livestock	Wildlife
Bull Mountain	......	......	......	......	.....	......	.....	1,131
Bull Mountain	14,519	12,209	1,917	393	0	NA	100	.....
Central	......	......	......	......	.....	......	.....	74
Central	2,920	960	0	706	1,254	Down	368	.....
Coalpits and Fault[a]	......	......	......	......	.....	......	.....	116
Coalpits	2,525	340	850	690	645	NA	129	.....
Fault	785	0	605	180	0	NA	37	.....
Cougar Canyon	......	......	......	......	.....	......	.....	766
Cougar Canyon	9,150	2,808	3,660	2,682	0	NA	120	.....
Curly Hollow	......	......	......	......	.....	......	.....	491
Curly Hollow	22,972	4,068	3,905	9,945	5,054	Up	945	.....
Dagget Flat	......	......	......	......	.....	......	.....	516
Dagget Flat	4,127	680	2,855	0	592	Down	266	.....
Desert Inn	......	......	......	......	.....	......	.....	2,452
Desert Inn	36,983	18,773	13,140	4,390	680	Static	1,355	.....
Dome	......	......	......	......	.....	......	.....	64
Dome	2,188	483	300	1,220	185	NA	89	.....
Warner Valley	880	280	120	480	0	NA	32	.....
Fort Pierce	......	......	......	......	.....	......	.....	562
Fort Pierce, UT	9,209	2,400	3,739	3,000	70	Down	535	.....

[a]Custodial management included in intensive management allotments.
NA = Not available

(continued)

APPENDIX VIII (continued)

Allotment			Livestock Forage Condition (Suitable Acreage)				Forage Production (AUM)	
	Public Land Acres					Apparent		
Name	(Total)	(Unsuitable)	Poor	Fair	Good	Trend	Livestock	Wildlife
Fort Pierce (continued)								
Fort Pierce, AZ	13,818	1,620	6,607	5,451	140	Down	630	.....
Spendlove	7,654	960	3,710	2,908	76	Down	500	.....
Gooseberry	......	......	......	......	.....	......	.....	70
Gooseberrry	4,440	0	0	2,353	2,087	Up	256	.....
Grafton	......	......	......	......	.....	......	.....	90
Grafton	7,258	2,380	3,982	896	0	NA	140	.....
Gunlock	......	......	......	......	.....	......	.....	80
Gunlock	6,334	1,456	4,308	570	0	NA	239	.....
Herd House	......	......	......	......	.....	......	.....	24
Herd House	2,870	722	480	834	834	NA	137	.....
Hurricane	......	......	......	......	.....	......	.....	30
Hurricane	2,070	490	409	849	322	NA	96	.....
Hurricane Fault	......	......	......	......	.....	......	.....	72
Eagle	1,595	645	690	240	20	Down	65	.....
Terrace	4,358	578	2,613	1,167	0	Down	252	.....
Frog Hollow	2,605	60	1,586	959	0	Down	321	.....
Workman Wash	1,988	408	1,500	80	0	Down	140	.....
Gould	8,300	661	4,369	3,184	86	Down	391	.....
Gould Ranch	580	0	580	0	0	Down	49	.....
Hurricane Mesa	......	......	......	......	.....	......	.....	280
Hurricane Mesa	6,811	2,790	4,021	0	0	NA	79	.....

[a]Custodial management included in intensive management allotments.
NA = Not available

(continued)

APPENDIX VIII (continued)

Allotment			Livestock Forage Condition (Suitable Acreage)				Forage Production (AUM)	
	Public Land Acres							
Name	(Total)	(Unsuitable)	Poor	Fair	Good	Apparent Trend	Livestock	Wildlife
Jackson Wash	......	......	......	......	.....	......	.....	682
Jackson Wash	28,680	2,430	24,150	2,100	0	Static	1,069	.....
Land Hill	......	......	......	......	.....	......	.....	27
Land Hill	1,030	30	1,000	0	0	NA	38	.....
Little Creek	......	......	......	......	.....	......	.....	59
Little Creek	14,595	2,545	10,477	0	1,573	Down	314	.....
Mesa[a]	......	......	......	......	.....	......	.....	100
Mesa	2,580	500	2,080	0	0	NA	41	.....
Minera Wash	......	......	......	......	.....	......	.....	427
Minera Wash	4,637	292	4,345	0	0	Down	206	.....
Red Cliffs	......	......	......	......	.....	......	.....	200
Red Cliffs	10,144	3,953	3,353	2,718	120	Down	255	.....
Silver Reef	1,170	40	930	200	0	NA	48	.....
Leeds	2,643	480	2,163	0	0	NA	73	.....
Sand Mountain	......	......	......	......	.....	......	.....	663
Sand Mountain	14,000	2,190	1,653	5,551	4,606	NA	935	.....
Sand	5,155	640	598	2,141	1,776	NA	390	.....
Sand Mountain Spring	1,930	0	270	907	753	NA	150	.....
Sandstone Mountain	......	......	......	......	.....	......	.....	65
Sandstone Mountain	2,531	340	820	1,371	0	NA	93	.....

[a]Custodial management included in intensive management allotments.
NA = Not available

(continued)

APPENDIX VIII (continued)

Allotment			Livestock Forage Condition (Suitable Acreage)				Forage Production (AUM)	
	Public Land Acres					Apparent		
Name	(Total)	(Unsuitable)	Poor	Fair	Good	Trend	Livestock	Wildlife
Santa Clara Creek	......	......	......	......	.....	......	.....	69
Santa Clara Creek	3,038	345	2,693	0	0	NA	69	.....
Scarecrow Peak[a]	......	......	......	......	.....	......	.....	900
Catclaw	3,410	550	1,973	887	0	Down	162	.....
Terry	10,350	0	7,142	3,208	0	Down	398	.....
Beaver Dam Wash	26,862	860	17,942	8,060	0	Down	1,105	.....
Snow Holding Pasture	3,495	0	3,495	0	0	NA	.....	.....
Short Creek	......	......	......	......	.....	......	.....	75
Short Creek	1,983	570	530	491	392	Down	269	.....
Canaan Gap	2,616	653	1,072	708	183	Static	301	.....
Canyon	581	145	337	99	0	Down	38	.....
Smith Mesa	......	......	......	......	.....	......	.....	137
Smith Mesa	1,940	400	1,540	0	0	NA	36	.....
Toquerville	......	......	......	......	.....	......	.....	233
Toquerville	4,734	4,299	205	230	0	Down	28	.....
Pintura	2,481	933	0	1,548	0	NA	111	.....
Ash Creek	1,839	160	60	1,619	0	NA	38	.....
LaVerkin	2,021	979	230	812	0	NA	2	.....
Trail	......	......	......	......	.....	......	.....	110
Trail	3,220	30	2,870	320	0	NA	147	.....
Twin Peaks	......	......	......	......	.....	......	.....	1,539
Twin Peaks	28,836	9,329	9,754	7,413	2,340	Down	1,056	.....

[a]Custodial management included in intensive management allotments.
NA = Not available

(continued)

APPENDIX VIII (continued)

Allotment			Livestock Forage Condition (Suitable Acreage)				Forage Production (AUM)	
	Public Land Acres							
Name	(Total)	(Unsuitable)	Poor	Fair	Good	Apparent Trend	Livestock	Wildlife
Veyo	......	......	......	......	.....	......	.....	234
Veyo	8,056	1,865	3,344	2,476	371	Up	324	.....
Virgin[a]	......	......	......	......	.....	......	.....	144
Virgin	4,890	1,550	304	3,036	0	Static	114	.....
Mountain Dell	1,600	860	0	740	0	NA	22	.....
Warner Ridge	......	......	......	......	.....	......	.....	23
Warner Ridge	1,884	1,079	177	500	128	NA	43	.....
Washington	......	......	......	......	.....	......	.....	306
Washington	9,765	6,365	1,269	1,740	391	NA	150	.....
White Dome[a]	......	......	......	......	.....	......	.....	43
White Dome	2,507	811	714	80	902	NA	109	.....
SUB TOTAL	505,862	117,174	224,177	138,931	25,580		19,498	16,710
CUSTODIAL								
Airport	......	......	......	......	.....	......	.....	0
Airport	147	0	0	147	0	NA	7	.....
Black Canyon	......	......	......	......	.....	......	.....	8
Black Canyon	600	174	0	426	0	NA	12	.....
Box Canyon	......	......	......	......	.....	......	.....	0
Box Canyon	659	69	590	0	0	Static	48	.....

[a]Custodial management included in intensive management allotments.
NA = Not available

(continued)

APPENDIX VIII (continued)

Allotment			Livestock Forage Condition (Suitable Acreage)				Forage Production (AUM)	
	Public Land Acres					Apparent		
Name	(Total)	(Unsuitable)	Poor	Fair	Good	Trend	Livestock	Wildlife
Cinder Mountain	......	......	......	......	.....	......	.....	0
Cinder Mountain	2,240	330	1,480	0	430	NA	27	.....
Dalton Wash	......	......	......	......	.....	......	.....	41
Dalton Wash	855	300	415	0	140	NA	26	.....
Lamoreaux	......	......	......	......	.....	......	.....	0
Lamoreaux	160	0	0	160	0	NA	11	.....
Little Plain	......	......	......	......	.....	......	.....	0
Little Plain	930	190	740	0	0	NA	16	.....
North Grafton	500	385	115	......	.....	......	.....	.....
Grafton	......	......	......	......	.....	......	.....	.....
Red Butte	......	......	......	......	.....	......	.....	0
Red Butte	894	674	0	220	0	NA	12	.....
Rock Spring	......	......	......	......	.....	......	.....	0
Rock Spring	820	90	321	409	0	NA	12	.....
Sand Hills	......	......	......	......	.....	......	.....	50
Sand Hills	992	140	852	0	0	NA	28	.....
Sand Wash Reservoir	......	......	......	......	.....	......	.....	.....
Sand Cove	640	260	200	180	0	NA	.....	.....
Stout	......	......	......	......	.....	......	.....	0
Stout	235	205	30	0	0	NA	2	.....

[a]Custodial management included in intensive management allotments.
NA = Not available

(continued)

APPENDIX VIII (concluded)

Allotment			Livestock Forage Condition (Suitable Acreage)				Forage Production (AUM)	
Name	Public Land Acres (Total)	(Unsuitable)	Poor	Fair	Good	Apparent Trend	Livestock	Wildlife
Yellow Knolls	......	......	......	......	.....	......	.....	0
Yellow Knolls	525	201	324	0	0	NA	16	.....
SUB TOTAL	10,197	3,018	5,067	1,542	570		217	99
ELIMINATION OF GRAZING								
LaVerkin Creek	......	......	......	......	.....	......	.....	269
LaVerkin Creek	10,716	8,676	2,040	0	0	NA	41	.....
Pace Knoll	......	......	......	......	.....	......	.....	3
Pace Knoll	1,885	1,705	0	180	0	NA	3	.....
Pintura Seeding	......	......	......	......	.....	......	.....	.....
Pintura	904	0	904	......	.....	......	.....	.....
SUB TOTAL	13,505	10,381	2,944	180	0		44	272
TOTAL	529,564	130,573	232,188	140,653	26,150		19,759	17,081

[a]Custodial management included in intensive management allotments.
NA = Not available

APPENDIX IX

Ecological Range Site Condition

SCS Range Site Number	Range Site Name	Public Land Acres Total	Excellent	Good	Fair	Poor
6	Southern Desert Loam	11,110	555	2,222	3,333	5,000
7	Southern Desert Sand	13,655	683	2,048	4,096	6,823
8	Southern Desert Shallow Hardpan	15,760	0	1,576	3,152	11,032
9	Southern Desert Stony Loam	14,899	745	1,638	5,066	7,450
10	Southern Semi Desert Malpai	16,360	2,450	4,100	4,100	5,710
11	Southern Semi Desert Shallow Hardpan (8 to 10 precipitation)	45,380	0	4,538	11,345	29,497
12	Southern Semi Desert Shallow Hardpan (10 to 12 precipitation)	39,390	0	0	11,817	27,573
13	Southern Semi Desert Shallow Loam	14,990	0	0	2,998	11,992
14	Upland Loam (summer precipitation)	800	0	0	160	640

Source: Soil Conservation Service, 1973 Survey.

Note: Range site numbers and names correspond to those contained in 1973 SCS Soil Survey. Range Site names also correspond to those contained in Appendix V.

(continued)

APPENDIX IX (continued)

SCS Range Site Number	Range Site Name	Public Land Acres Total	Excellent	Good	Fair	Poor
15	Upland Sand (pinyon-juniper - summer precipitation)	2,560	NA	NA	NA	NA
16	Upland Shallow Shale (pinyon-juniper - summer precipitation)	2,850	NA	NA	NA	NA
17	Upland Stony Hills (juniper - summer precipitation)	67,811	NA	NA	NA	NA
18	Upland Stony Loam (pinyon-juniper summer precipitation)	4,520	0	1,130	2,260	1,130
19	Southern Upland Loam	2,320	0	222	494	1,604
20	Southern Upland Loam (shrub)	20,161	0	2,016	8,065	10,080
21	Southern Upland Shallow Loam (pinyon-juniper)	12,900	NA	NA	NA	NA
22	Southern Upland Stony Sand (pinyon-juniper)	5,560	NA	NA	NA	NA
25	Semiwet Stream Bottoms	465	0	0	418	47

Note: Range site numbers and names correspond to those contained in 1973 SCS Soil Survey. Range site names also correspond to those contained in Appendix V.

NA = Not available

(continued)

APPENDIX IX (continued)

SCS Range Site Number	Range Site Name	Public Land Acres Total	Excellent	Good	Fair	Poor
26	Southern Semi Desert Loam	6,420	0	321	963	5,136
	TOTALS	297,911	4,433	19,811	58,267	123,719
	PERCENT		1	4	11	23

Acres from range sites 15, 16, 17, 21, and 22 where there is no information available: 91,681, 17%.

Not a range site: 231,653, 44%

Total all acres: 529,564 100%

Note: Range site numbers and names correspond to those contained in 1973 SCS Soil Survey. Range Site names also correspond to those contained in Appendix V.

NA = Not available

APPENDIX X

Description of Survey Procedures

The following is a summary of procedures used to determine the present and potential grazing capacity in the Hot Desert ES area.

The procedure has been divided into three components and will be discussed in the following order: (1) determination of current grazing capacity; (2) allocation of grazing capacity to livestock and wildlife; and (3) determination of potential grazing capacity.

Determination of Current Grazing Capacity. During 1976, BLM employees completed a forage inventory in the Hot Desert ES area. The Ocular Reconnaissance Inventory Method (BLM Manual 4412.11A) was used and the following is a summary of procedures.

The inventory consisted of 2 phases: data collection and compilation of data. In order to complete the data collection phase, the ES area was first divided into vegetative subtypes (a relatively homogenous group of plants). Photo interpretation was used to outline the more obvious vegetative subtypes on aerial photography. These delineations were verified and added to during the data gathering process. Some of the major vegetative subtypes identified in the ES area were galleta grass, crested wheatgrass, sagebrush, sandsage, blackbrush, bursage, cresote bush, snakeweed, live oak, and pinyon-juniper. A write-up area was delineated for each vegetative subtype by allotment.

The next phase was collecting data within the various write-up areas. The Ocular Reconnaissance Inventory Method required measurement or estimation of vegetative density (cover) and composition of the various species within each vegetative subtype. To get a reasonably accurate sample, the data collection team first established the location of one or more sites within the write-up area which reasonably represented the vegetative characteristics of the writeup area.

A 100-point transect was then run. At each point on the transect, the observer determined if a "hit" was made on a plant. If so, the species was recorded and a determination was made whether the plant was

available to grazing animals. The number of hits of vegetation were then translated directly into density (percent vegetative cover), i.e., 25 hits equals 25 percent density. The determination of plant composition for each species by write-up area was made using the transect information supplemented by an ocular estimate of composition because a 100-point transect does not give an accurate representation of plant composition by itself. Training to estimate percent composition was conducted by running a transect until 100 hits were obtained on live vegetation. The percentage of hits on any particular species was divided by the total hits and that figure became the percentage composition, i.e., 20 hits on plant A divided by 100 equals 20 percent composition of plant A. All transect information was supplemented by other observations within the write-up area. The results of the transect and observations were recorded on BLM form Resource Field Data Record. This process was repeated for each of the 900 write-up areas in the Hot Desert area.

A number of other observations were also made in each write-up area such as livestock forage condition rating, apparent trend, utilization patterns, erosion conditions, range suitability, plant phenology, threatened and endangered plant species, existing range improvements, undeveloped water, percent slope, elevation, exposure, transect hits on litter, bare ground, and rocks.

The second phase of determining grazing capacity involved compilation. The following is a description of the actions taken to arrive at a grazing capacity. The first step was to multiply the composition of each species by the Proper Use Factor (PUF). A PUF represents the percent of a plant's current year's growth that can be consumed by grazing animals without causing damage to the plant or a decline in range condition. Proper Use Factors varied depending on the physiology of the plant, type of grazing animal, and the season when grazing occured. Proper Use Factors for all common species were listed by grazing animal and each grazing season on a PUF table. Form 4412-1 shows an example of PUFs and how they are used in a grazing capacity determination.

The products of multyplying each species' composition by the appropriate PUF was then added. This sum was multiplied by the average vegetative density (percent vegetative cover) and is shown on Form 4412-1 as the Forage Acre Factor (FAF). The forage acre factor represented the part of an area that was covered with usable forage in the write-up area, i.e., FAF of 3.9 means that 3.9 percent of the write-up area was covered with available forage.

The next step involved multiplying the FAF by a utilization factor. The utilization factor is the percent of the forage usable by a particular group of animals (cows, sheep, deer, etc.) within the write-up area. In the Hot Desert ES area, the percent utilization factor was 100 percent, since unsuitable acres were not included within the write-up areas. They were delineated prior to determination of write-up areas. Some write-up areas included deer AUMs only because the entire area was unsuitable for livestock grazing. The product of this multiplication (FAF x Utilization Factor = Net FAF) is the Net Forage Acre Factor.

Following this process, the Net Forage Acre Factor was divided by the Forage Acre Requirement (FAR). The FAR is that portion of an acre covered with sufficient forage to sustain one cow and calf or their equivalent for 1 month.

The result of this division process is the grazing capacity of the writeup area expressed in acres per AUM, i.e., the number of acres required to produce one AUM. By dividing this figure into the number of acres in the vegetative subtype, the number of AUMs available was obtained (Form 4412-1). This process was repeated for each of the 900 write-up areas in the Hot Desert ES area. The result was the total number of AUMs available for grazing.

One of the most important steps of the Ocular Reconnaissance Inventory Method was determining the Forage Acre Requirement. A total of three Forage Acre Requirements was utilized in the Hot Desert ES area. A 0.4 FAR was computed on the crested wheatgrass seedings. At the higher elevations and on sandy sites, a 0.6 FAR was used and the major FAR 0.7 was utilized on the remaining area.

The Forage Acre Requirement of 0.7 was determined from a pasture in good range condition containing 4,991 acres. Actual use and utilization data were available over a 5-year period and the pasture had similar vegetative subtypes, soils and precipitation data as the ES area.

To determine the forage acres on the proper grazed pasture, six 100-point transects were completed in each of the four vegetative subtypes. A forage acre is the number of acres in a specific area that are completely covered by available forage.

Calculations used to compute the Forage Acre Requirement are illustrated in table 1.

The calculations reveal a properly grazed pasture for a forage acre requirement is determined from actual use and utilization studies. The same personnel who determined the FAR, surveyed the Hot Desert ES area. Therefore, the area surveyed was compared to the properly grazed pasture in terms of whether or not it was more or less productive.

Allocation of Grazing Capacity to Livestock and Wildlife. To allocate grazing capacity for livestock and wildlife, a total allowable PUF was assigned to each plant species and then appropriated between livestock and wildlife (Form 4412-1). As an example, the following PUFs were established for blackbrush:

	Cattle	Wildlife
Total Allowable	PUF or percent current years' growth allocated	PUF or percent current years' growth allocated
Blackbrush 25	10	15

If the write-up area is suitable for grazing and cattle and wildlife are present, then 25 percent of the current year's growth is allocated to cattle and wildlife, 10 percent to cattle and 15 percent to wildlife.

TABLE 1

Forage Acre Requirement Calculations

Write-Up Area	Surface Area	X	Forage Acre Factor	Forage Acre
1	615		0.0482	29.64
2	1,322		0.06435	85.07
3	220		0.054	11.88
4	2,834		0.03585	97.77
	4,991			228.09

Utilization On Big Galleta Grass (Hilaria rigida)

Transect	Percent Utilization	X	Acres	=	Weighted Factor
WS-1	0.32		621		198.72
WS-2	0.52		996		517.92
WS-3	0.58		856		496.48
WS-4	0.40		896		358.40
WS-5	0.16		1,622		759.52
			4,991		1,831.04

$$\frac{1{,}831.04}{4{,}991.00} = 37\% \text{ Utilization}$$

Average Utilization = 37 percent
Average Actual Use = 240 AUMs

$$\frac{37\% \text{ (Utilization)}}{50\% \text{ (Proper Utilization)}} \times \frac{240 \text{ (Actual Use)}}{X \text{ (Proper AUMs)}}$$

$$\frac{120}{37\%} = 324 \text{ Proper Use AUMs}$$

$$\frac{\text{Forage Acres}}{\text{Proper Use AUMs}} = \frac{228.09}{324.00} = 0.7 \text{ Forage Acre Requirement}$$

$$\frac{\text{Acres in Pasture}}{\text{Proper Use AUMs}} = \frac{4{,}991}{324} = 15.4 \ \frac{\text{ac}}{\text{AUM}}$$

$$15.4 \ \frac{\text{ac}}{\text{AUM}} = \text{Proper Stocking rate for Pasture}$$

If wildlife is not present and the write-up area is suitable for cattle, then only 10 percent of the current year's growth can be allowed for cattle. Likewise, if the write-up area is unsuitable for cattle but suitable for wildlife, then only 15 percent of the current year's growth can be allocated to wildlife. This is because the PUF is based on the percent current year's growth a plant can be utilized by a specific animal without causing a decline in range condition. For example, Mormon tea is a key species present in the blackbrush subtype. By the time cattle have utilized Mormon tea, approximately 50 percent of the blackbrush has been grazed about 10 percent. But if 25 percent of the current year's growth of blackbrush was allocated to cattle, Mormon tea would be utilized in excess of the proper amount and the range condition would decline.

Existing and potential wildlife numbers were furnished by the Division of Wildlife Resources.

Determination of Potential Grazing Capacity. Immediately following the Ocular Reconnaissance Inventory in the Hot Desert ES area, BLM personnel determined potential grazing capacity on 16 sites which included relic and good condition areas. All of these sites were located within the Hot Desert ES area and represented different vegetative subtypes, soils associations, and precipitation zones.

Those sites in or near a climax condition were used as comparison areas to determine the capability of the various range sites to produce livestock and wildlife forage under ideal conditions.

The potential grazing capacity for livestock and wildlife on the 16 sites was determined by the Ocular Reconnaissance Inventory Method and then compared to range sites that were not in good condition, but contained similar soils, vegetation, and precipitation. The potential AUMs that the range sites are capable of producing were then summarized in the AMP. However, the AMPs do not contain the Ecological Site Potential AUMs in all cases, but are those potential AUMs that could possibly be achieved through proper management within the time designated in the objectives of the AMP, usually a 24-year period. Appendix I indicates

that a total of 27,926 livestock AUMs are expected to be produced when management plans are implemented and objectives attained.

Ecological site potential production was also determined using information obtained by SCS, in their 1973 Soil Survey of Washington County. They used the Weight Estimate Inventory Method to sample 19 relic sites within or near the ES area. The total pounds per acre of forage being produced on these sites were obtained and averaged over a 5-year period. The total pounds of forage being produced from each of the 19 sites were then compared to 15 soil associations and various range sites containing approximately 200 soil series. This information was interpreted and converted from total production under ideal site conditions to usable livestock forage production.

Because different methods were used to develop the two Ecological Site Potentials, they are not directly comparable. Ecological site potential is determined by obtaining a relative comparison of the capability of a site to produce livestock forage under ideal site conditions.

Ecological site information is not complete for all allotments because there was no survey made on Arizona lands. Information that is available indicates that more than 1.7 times the amount of potential forage as determined by BLM is capable of being produced under ecological conditions (Appendix I). A total of 48,804 AUMs of livestock forage is ecologically capable of being produced on the allotment proposed for custodial and intensive management.

A few allotments show more AUMs being managed for livestock forage potential than are possible for the site to produce (ecological site potential) because of different criteria for determining range site used by SCS and BLM. The difference lies mainly in the determination of suitability criteria using erosion susceptibility as the main component for this determination.

APPENDIX XI

Habitat Condition and Season of Use for Key Wildlife Species

Allotment	Wildlife AUMs	Key Wildlife Species[a] Deer Habitat	Quail[b] Habitat	Tortoise[b] Habitat
Alger Hollow	1,111	Good; important winter range	Good	Good
Apex Slope	130	Fair; yearlong	Good	Nonexistent
Beaver Dam Slope	1,626	Fair; winter, yearlong	Good	Poor; declining
Big Mountain	810	Good; important summer and winter range	Poor	Nonexistent
Boomer Hill	89	Fair; yearlong	Good	Nonexistent
Boot Spring	90	Poor	Fair	Nonexistent
Bull Mountain	1,131	Good; important winter range	Fair	Nonexistent
Central	74	Good; important winter range	Fair	Nonexistent
Coal Pits and Fault[c]	116	Good; critical winter range	Poor	Nonexistent
Cougar Canyon	766	Good; important winter range	Poor	Nonexistent

NOTE:

Good condition. Key forage species for each particular animal are present in sufficient quantity. All other habitat requirements are also favorable.

Fair condition. Key forage species are present but in lesser amounts; population may also be limited by shortage of water or cover.

Poor condition. If key forage species are present, they are scarce. Water or cover may also be lacking. Habitat can support only a few animals.

[a]Those most probably impacted by proposed action.
[b]Season of use for quail and tortoise is yearlong.
[c]Custodial management included in intensive management allotments.

(continued)

APPENDIX XI (continued)

Allotment	Wildlife AUMs	Key Wildlife Species[a] Deer Habitat	Quail[b] Habitat	Tortoise[b] Habitat
Curly Hollow	491	Fair; yearlong	Good	Nonexistent
Dagget Flat	516	Good; critical summer and winter range	Poor	Nonexistent
Desert Inn	2,452	Good; important winter range	Fair	Nonexistent
Dome	64	Poor	Fair	Nonexistent
Fort Pierce	562	Poor	Good	Nonexistent
Gooseberry	70	Good; yearlong	Poor	Nonexistent
Grafton	90	Good; yearlong	Fair	Nonexistent
Gunlock	80	Good; winter, spring	Good	Nonexistent
Herd House[c]	24	Poor	Fair	Nonexistent
Hurricane[c]	30	Poor	Good	Nonexistent
Hurricane Fault	72	Fair; yearlong	Good	Nonexistent
Hurricane Mesa[c]	280	Good; critical winter range; browse severely overused and in poor vigor	Poor	Nonexistent
Jackson Wash	682	Good; winter	Good	Nonexistent
Land Hill	27	Fair; yearlong	Good	Nonexistent
Little Creek	59	Fair; yearlong	Poor	Nonexistent
Mesa[c]	100	Good; important winter range	Poor	Nonexistent

[a] Those most probably impacted by proposed action.
[b] Season of use for quail and tortoise is yearlong.
[c] Custodial management included in intensive management allotments.

(continued)

APPENDIX XI (continued)

Allotment	Wildlife AUMs	Key Wildlife Species[a] Deer Habitat	Quail[b] Habitat	Tortoise[b] Habitat
Minera Wash	427	Good; important winter range	Fair	Nonexistent
Red Cliffs	200	Good; important winter range	Good	Nonexistent
Sand Mountain	663	Poor	Good	Nonexistent
Sandstone Mountain	65	Poor	Good	Nonexistent
Santa Clara Creek	69	Fair; yearlong	Good	Nonexistent
Scarecrow Peak	900	Good; important winter range	Good	Nonexistent
Short Creek	75	Fair; yearlong	Good	Nonexistent
Smith Mesa	137	Good; critical winter range; browse overused and in poor vigor	Poor	Nonexistent
Toquerville	233	Good; critical winter range	Fair	Nonexistent
Trail	110	Fair; winter	Fair	Nonexistent
Twin Peaks	1,539	Good; important winter range	Fair	Nonexistent
Veyo	234	Good; important winter range	Fair	Nonexistent
Virgin[c]	144	Good; critical winter range	Good	Nonexistent
Warner Ridge	23	Poor	Poor	Nonexistent

[a]Those most probably impacted by proposed action.
[b]Season of use for quail and tortoise is yearlong.
[c]Custodial management included in intensive management allotments.

(continued)

APPENDIX XI (continued)

Allotment	Wildlife AUMs	Key Wildlife Species[a] Deer Habitat	Quail[b] Habitat	Tortoise[b] Habitat
Washington	306	Fair; winter	Fair	Nonexistent
White Dome[c]	43	Poor	Good	Nonexistent
SUB TOTAL	16,710			
CUSTODIAL				
Airport	0	Poor	Fair	Nonexistent
Black Canyon	8	Good; critical winter range	Poor	Nonexistent
Box Canyon	0	Poor	Fair	Nonexistent
Cinder Mountain	0	Poor	Poor	Nonexistent
Dalton Wash	41	Good; critical winter range	Poor	Nonexistent
Lamoreaux	0	Good; critical winter range	Poor	Nonexistent
Little Plain	0	Poor	Poor	Nonexistent
North Grafton	0	Good; critical winter range	Poor	Nonexistent
Red Butte	0	Good; critical winter range	Poor	Nonexistent
Rock Springs	0	Good; critical winter range	Poor	Nonexistent
Sand Hills	50	Poor	Good	Nonexistent
Sand Wash Reservoir Sand Cove	0	Good; important winter, spring	Fair	Nonexistent

[a]Those most probably impacted by proposed action.
[b]Season of use for quail and tortoise is yearlong.
[c]Custodial management included in intensive management allotments.

(continued)

APPENDIX XI (concluded)

Allotment	Wildlife AUMs	Key Wildlife Species[a] Deer Habitat	Quail[b] Habitat	Tortoise[b] Habitat
CUSTODIAL (concluded)				
Stout	0	Poor	Poor	Nonexistent
Yellow Knolls	0	Poor	Fair	Nonexistent
SUB TOTAL	99			
ELIMINATION OF GRAZING				
LaVerkin Creek	269	Good; critical winter range	Poor	Nonexistent
Pace Knoll	3	Fair; winter, spring	Poor	Nonexistent
Pintura Seeding	0	Good; critical winter range; seeding overused and in poor vigor	Poor	Nonexistent
SUB TOTAL	272			
TOTAL	17,081			

[a]Those most probably impacted by proposed action.
[b]Season of use for quail and tortoise is yearlong.
[c]Custodial management included in intensive management allotments.

APPENDIX XII

Deer Pellet Group Transects

Transect Number	Name	Deer Days Use/Acre									
		1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Herd Unit 58											
1	Cottam	84	62	40	14	19	24	36	36	54	...
2	East Mesa	44	31	101	22	20	20	38	56	36	9
3	Dry Creek	...	12	57	0	8	16	18	9	5	5
4	Emerald	75	19	58	38	31	39	26	13	8	7
5	Anderson Junction	28	9	46	15	20	11	18	26	19	11
6	Browse-Sylvester	27	11	79	44	23	52	31	24	50	64
Herd Unit 61-A											
7	Cottonwood	16	8	2	13	14	6	1	0	0	0
8	Dastlock Ranch	39	35	66	51	55	39	28	14	18	6
9	Mill Creek	81	76	74	37	83	42	64	19	17	9
10	Anderson Res.	60	78	18	22	10	9	18	48	23	11
11	Yant Flat	9	9	6	7	25	9	3	1	7	0
Herd Unit 61-B											
12	Wide Canyon	22	31	35	51	23	11	25	16	11	3
13	Truman Bench	7	6	47	41	34	55	19	40	31	15
14	Cove Mountain	16	23	44	18	54	56	27	24	20	13
15	Iron Peg	14	20	33	20	36	24	16	12	7	12
16	Paradise Res.	14	6	31	41	20	43	...	30	17	13
17	Mound Valley	...	...	...	...	16	14	14	9	13	6
18	West Valley	...	...	...	...	...	...	...	29	42	8
Herd Unit 61-C											
19	Poachers Pass	0	0	12	22	13	14	14	10	20	4
20	Jackson	...	...	...	13	8	7	11	7	5	4
21	Minera Wash	9	11	15	16	18	15	16	29	13	7
22	Middle Ridge	9	7	12	0	10	5	15	26	6	1
23	Tobin Bench	12	1	25	10	14	24	15	21	19	14
24	Racer Canyon	2	2	8	1	7	18	15	17	19	7
25	Moody Wash	5	2	10	5	35	27	20	17	...	12
26	Colie Flat	8	7	15	8	34	29	4	18	22	15
27	Lost Spring	10	4	27	7	30	22	30	32	26	15
28	Butcher Knife	17	14	28	6	...	17	41	16	27	27

Source: Utah Division of Wildlife Resources 1967-1976

Note: Trace transects were conducted annually by DWR personnel to determine deer census.

APPENDIX XIII

Browse Transects 1976

No.	Key[a] Species	Estimated Utilization	Age Class: Seedlings and Young	Age Class: Decadent	Form Class: Satisfactory	Form Class: Unsatisfactory
A	Putr	82%	8%	16%	12%	88%
B	Artr	68	0	4	32	68
C_1	Putr	79	4	60	12	88
C_2	Artr	90	12	36	36	64
C_3	Cesp	68	12	16	44	56
D	Come	43	0	32	56	44
E	Come	52	0	70	58	42
F	Artr	82	0	16	32	68
G	Putr	90	0	24	20	80
H	Come	80	0	60	32	68
I	Come	53	0	36	52	48
J	Come	72	0	36	44	56

Source: BLM files, Cedar City District Office

Note: These transects were conducted by BLM personnel in 1976 to determine deer use in specific areas.

[a] Putr: _Purshia tridentata_ (antelope bitterbrush)
Artr: _Artemesia tridentata_ (big sagebrush)
Cesp: _Ceanothus_ spp. (deerbrush)
Come: _Cowania mexicana_ (cliffrose)
Amut: _Amelanchier utahensis_ (serviceberry)

APPENDIX XIV

Sources of Groundwater Recharge

Cordova, et al., using the 12-inch isohyetal for determining ground water recharge, derived a value of 70,000 acre-feet per year for the Pine Valley Mountains, most of this flowing southward into the ES area. No figures are available for Beaver Dam Wash or for the areas east of Hurricane Fault. Using a similar technique with the 12-inch isohyteal on the Pine Valley and Bull Valley Mountains of Utah and Nevada, a rough estimate of 30,000 acre-feet per year recharge is obtained. Since 8,000 acre-feet per year passes through Hurricane Fault, ground water recharge entering that area from north and east is probably at least double that value. A rough estimate of 16,000 acre-feet recharge for areas east of Hurricane Fault are used. This produces a recharge from precipitation of 116,000 acre-feet per year.

Two other types of recharge are available. Surface infiltration and ground water flowing in from outside the ES area. Using figures given by Cordova, et al., and expanding to the total ES area, a value of 19,000 acre-feet per year results from surface infiltration, and 27,000 acre-feet from subsurface inflow from adjoining areas, primarily from Arizona via Fort Pierce Wash.

APPENDIX XV

Estimates of Water Needs on Public Land in Washington County

		ANNUAL REQUIREMENTS						
		1972						
Type of Use	Units	Surface Flow	Surface Storage	Sub-Surface	Total	1980	2000	2020
Large mammals	AUMs	....	...	...	....	....	....	....
	Acre/feet	1.9	1.0	0	2.9	3.1	3.3	3.2
Other wildlife	AUMs	....	...	...	195,000	195,000	195,000	195,000
	Acre/feet	0.9	0.5	0	1.4	1.4	1.4	1.4
Waterfowl Habitat	AUMs	....	...	...	238	250	250	250
	Acre/feet	1,309	0	0	1,309	1,375	1,375	1,375
Livestock Use	AUMs	....	...	...	33,397	33,397	33,904	33,904
	Acre/feet	24.4	5.6	0.6	30.6	30.6	31	31
Water Control Structures	Number							
	Acre/feet	0	0	0	0	2.0	....	....
Visitor Use	Rec-Day	....	...	...	35,000	37,500	53,500	53,500
	Acre/feet	0.8	0	0	0.8	0.9	1.3	1.3
Impoundments	Number	....	...	...	39	69	84	84
	Acre/feet	130	0		130	181.8	200.8	200.8
Total Water Need	Acre/feet	1,467	7.1	0.6	1,474.7	1,594.8	1,612.8	1,612.7

Source: Survey of Water Requirements for Resource Uses on BLM Lands in Utah, BLM 1973

APPENDIX XVI

Population Characteristics - Washington County, Utah

	1960				1970				1960-1970 Percentage Change	
	Washington	Percent	Utah	Percent	Washington	Percent	Utah	Percent	Washington	Utah
TOTAL	10,271	.....	890,627	....	13,669	.....	1,059,273	....	33.1	18.9
Sex										
Male	5,182	50.5	44,924	50	6,784	49.6	523,265	49.4	30.9	17.6
Female	5,084	49.5	445,703	50	6,885	50.4	536,008	50.6	35.4	20.3
Race										
White	10,139	98.7	873,828	98.1	13,470	98.5	1,031,926	97.4	. 32.9	13.1
Negro	1	0.2	4,148	0.5	6	0.2	6,617	0.6	500.0	59.5
Indian	125	1.2	6,961	0.8	167	1.2	11,273	1.1	33.6	61.9
Other	6	0.1	5,690	0.6	26	0.2	9,457	.9	333.3	66.2
Urban	5,130	49.9	667,158	74.6	7,097	51.9	851,472	80.4	38.3	27.6
Rural	5,141	50.1	223,469	25.1	6,572	48.1	207,801	19.6	27.8	-6.9
Households										
Number of households	2,793	.....	241,532	....	3,834	.....	297,934	....	37.3	23.4
Population in households	10,224	.....	874,100	....	13,196	.....	1,030,705	....	29.1	17.9
Population per household	3.66	.....	3.62	....	3.44	.....	3.46	....	-6.0	-4.4
Land area										
Square mile	2,425	.....	82,339	....	2,427	.....	82,096	....	.1	- .3
Density										
Population per square mile	4.2	.....	10.8	....	5.6	.....	12.9	....	33.3	19.4
Age distribution										
0-4	1,311	12.8	126,209	14.2	1,388	10.2	111,798	10.6	5.9	-11.4
4-15	2,633	25.6	208,083	23.2	3,054	22.2	240,751	22.7	16.0	15.7
15-19	1,033	10.1	76,216	8.5	1,848	13.5	116,607	11.0	78.9	53.0
20-24	456	4.4	60,530	9.8	967	7.1	97,859	9.3	112.1	61.7
25-44	2,011	19.6	217,475	24.4	2,432	17.8	237,509	22.4	20.9	9.2
45-64	1,733	16.9	142,157	16.0	2,297	16.8	177,188	16.7	32.5	24.6
65 and over	1,094	01.7	59,957	6.7	1,683	12.3	77,561	7.3	53.8	29.4

Source: U.S. Bureau of the Census, Census of Population: 1960-1970, Utah: General Population Characteristics (Washington, D.C.: U.S. Government Printing Office).

APPENDIX XVII

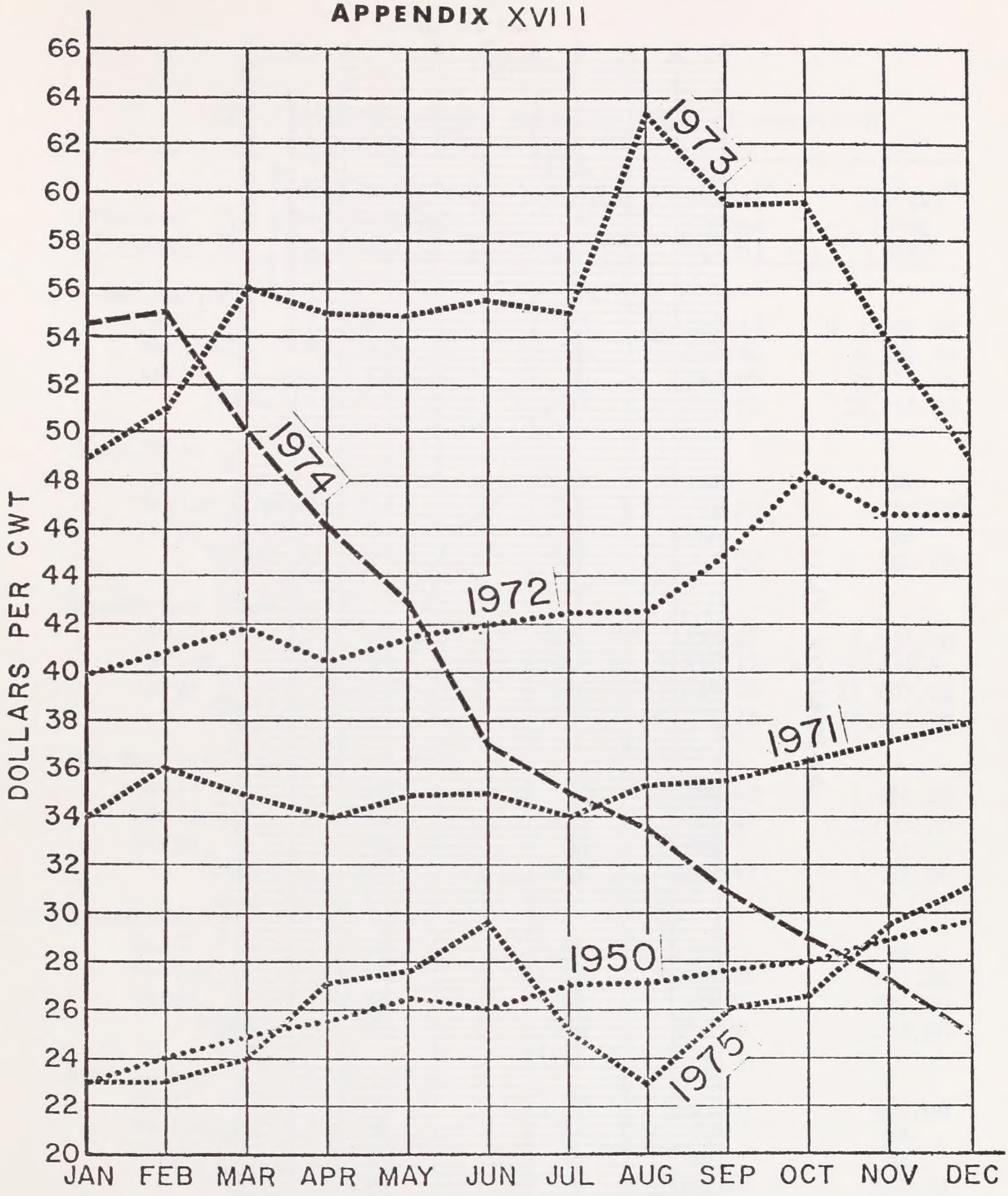
Total Personal Income by Major Source, Washington County, Utah
(Thousands of Dollars)

	1970	1971	1972	1973	Percent Change 1970-1973
Labor and Proprietors' Income[a]	$22,083	$24,117	$28,341	$33,487	51.6
By Type					
Wage and Salary Disbursements	17,013	18,423	21,546	24,127	41.8
Other Labor Income	693	826	1,047	1,164	68.0
Proprietor's Income	4,377	4,868	5,748	8,196	87.3
Farm	1,877	1,771	2,047	4,263	127.1
Nonfarm	2,500	3,097	3,701	3,933	57.3
By Industry					
Farm	2,213	2,095	2,346	4,592	107.5
Nonfarm	19,870	22,022	25,995	28,895	45.4
Manufacturing	1,122	1,568	2,267	2,353	109.7
Mining	b	b	b	b	b
Contract Construction	3,087	2,830	3,642	4,434	43.6
Wholesale and Retail Trade	5,664	6,479	7,659	8,125	43.4
Finance, Insurance, and Real Estate	548	775	1,045	1,093	99.5
Transportation, Communications, and Public Utilities	790	864	957	1,211	53.3
Services	2,506	2,742	3,093	3,427	36.8
Government	5,798	6,305	6,892	7,705	32.9
Federal, Civilian	1,200	1,271	1,242	1,505	25.4
Federal, Military	568	579	680	728	28.2
State and Local	4,030	4,455	4,970	5,472	35.8
Other Industries	b	b	b	b	b
Less: Personal Contributions for Social Insurance[a]	946	1,126	1,346	1,674	77.0
Residence Adjustment	1,815	2,151	1,994	2,101	15.8
Property Income[c]	6,839	7,657	8,780	9,743	42.5
Transfer Payments[c]	5,003	5,957	6,869	8,282	65.5
Total Personal Income[c]	$34,794	$38,756	$44,638	$51,939	49.3

[a]By place of work.
[b]Not shown to avoid disclosure of confidential information or for items $50,000 or less. Data are included in totals.
[c]By place of residence.

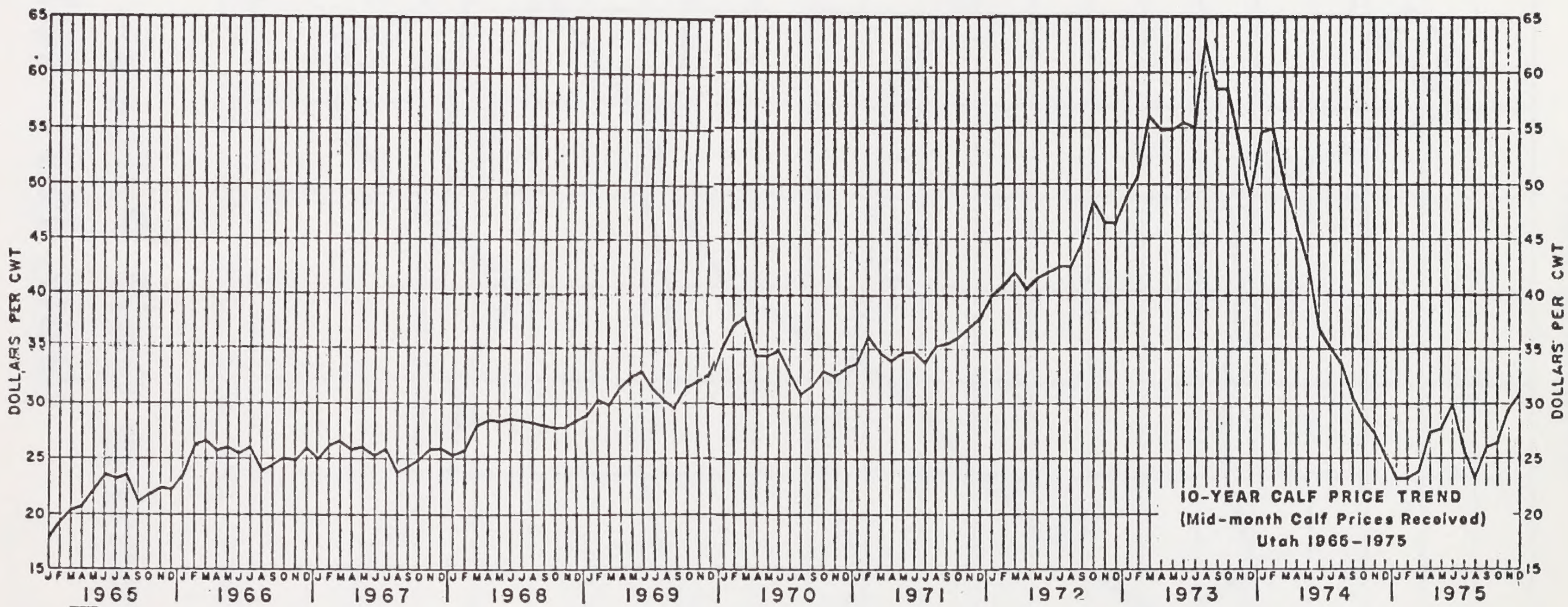
Source: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economics Information System File (April 1975).

APPENDIX XVIII



Monthly Calf Prices – Utah 1950, 1971–1975

APPENDIX XVIII



APPENDIX XIX

1976 Allotment Economic Value (by Scale of Operation)

Proposed Allotment	Base Property Qualifications (AUMs)	1976 Licensed Use (AUMs)	Annual Income[a] (AUM)	Capital Value[b] (AUM)
Alger Hollow				
Small	453	161	$ 214.13	$ 3,922.98
Medium	541	386	814.46	5,193.60
Large	316	87	240.99	2,673.36
TOTAL	1,310	634	1,269.58	12,242.94
Apex Slope				
Small	NA	NA	NA	NA
Medium (sheep)	366	100	42.20[c]	702.72[c]
Large	NA	NA	NA	NA
TOTAL	366	100	42.20	702.72
Beaver Dam Slope				
Small	223	222	295.26	1,931.18
Medium	1,716	1,607	3,390.77	16,473.6
Large	1,372	375	1,038.75	11,607.12
TOTAL	3,311	2,204	4,724.78	30,011.90
Big Mountain				
Small	168	80	106.40	1,454.88
Medium	322	237	500.07	3,091.20
Large	NA	NA	NA	NA
TOTAL	490	317	606.47	4,546.08
Boomer Hill				
Small	NA	NA	NA	NA
Medium	56	56	118.16	537.60
Large	100	50	138.50	846.00
TOTAL	156	106	256.66	1,383.60
Boot Spring				
Small	100	99	131.67	866.00
Medium	NA	NA	NA	NA
Large	NA	NA	NA	NA
TOTAL	100	99	131.67	866.00

[a]Based on 1976 licensed use AUMs by scale of operation: small = 1.33, medium = 2.11, and large = 2.77.
[b]Based on Base Property Qualifications AUMs by scale of operation: small = 8.66, medium = 9.60, large 8.46.
[c]Sheep values have been converted to equivalent cattle rates because of insufficient data.
NA = Not applicable

(continued)

APPENDIX XIX (continued)

Proposed Allotment	Base Property Qualifications (AUMs)	1976 Licensed Use (AUMs)	Annual[a] Income (AUM)	Capital[b] Value (AUM)
Bull Mountain				
Small	373	107	142.31	3,230.18
Medium	NA	NA	NA	NA
Large	NA	NA	NA	NA
TOTAL	373	107	42.31	3,230.18
Central				
Small	306	306	406.98	2,649.96
Medium	60	60	126.60	576.00
Large	NA	NA	NA	NA
TOTAL	366	366	533.58	3,531.96
Coalpits & Fault				
Small	NA	NA	NA	NA
Medium	220	214	451.54	2,112.00
Large	NA	NA	NA	NA
TOTAL	220	214	451.54	2,112.00
Cougar Canyon				
Small	120	45	59.85	1,039.20
Medium	NA	NA	NA	NA
Large	NA	NA	NA	NA
TOTAL	120	45	59.85	1,039.20
Curly Hollow				
Small	186	185	246.05	1,610.76
Medium	1,176	1,042	2,198.62	11,289.60
Large	NA	NA	NA	NA
TOTAL	1,362	1,227	2,444.67	12,900.36
Dagget Flat				
Small	NA	NA	NA	NA
Medium	183	183	386.13	1,756.80
Large	126	126	349.02	1,065.96
TOTAL	309	309	735.15	2,822.76

[a]Based on 1976 licensed use AUMs by scale of operation: small = 1.33, medium = 2.11, and large = 2.77.
[b]Based on Base Property Qualifications AUMs by scale of operation: small = 8.66, medium = 9.60, large 8.46.
[c]Sheep values have been converted to equivalent cattle rates because of insufficient data.
NA = Not applicable

(continued)

APPENDIX XIX (continued)

Proposed Allotment	Base Property Qualifications (AUMs)	1976 Licensed Use (AUMs)	Annual[a] Income (AUM)	Capital[b] Value (AUM)
Desert Inn				
Small	NA	NA	NA	NA
Medium	NA	NA	NA	NA
Large	1,584	0	0	13,400.64
TOTAL	1,584	0	0	13,400.64
Dome				
Small	30	30	39.90	259.80
Medium	221	206	434.66	2,121.60
Large	94	94	260.38	795.24
TOTAL	345	330	734.94	3,176.64
Fort Pierce				
Small	526	335	445.55	4,555.16
Medium	511	511	1,078.21	4,905.60
Large	1,002	268	742.36	8,476.92
TOTAL	2,039	1,114	2,266.12	17,937.68
Gooseberry				
Small	256	256	340.48	2,216.96
Medium	NA	NA	NA	NA
Large	NA	NA	NA	NA
TOTAL	256	256	340.48	2,216.96
Grafton				
Small (sheep)	168	168	d	d
Medium	280	280	590.80	2,688.00
Large	NA	NA	NA	NA
TOTAL	448	448	590.80	2,688.00
Gunlock				
Small	NA	NA	NA	NA
Medium	338	335	713.18	3,244.80
Large	152	152	421.04	1,285.92
TOTAL	490	487	1,134.22	4,530.72

[a]Based on 1976 licensed use AUMs by scale of operation: small = 1.33, medium = 2.11, and large = 2.77.
[b]Based on Base Property Qualifications AUMs by scale of operation: small = 8.66, medium = 9.60, large 8.46.
[c]Sheep values have been converted to equivalent cattle rates because of insufficient data.
NA = Not applicable

(continued)

APPENDIX XIX (continued)

Proposed Allotment	Base Property Qualifications (AUMs)	1976 Licensed Use (AUMs)	Annual[a] Income (AUM)	Capital[b] Value (AUM)
Herd House				
Small	140	72	95.76	1,212.40
Medium	NA	NA	NA	NA
Large	NA	NA	NA	NA
TOTAL	140	72	95.76	1,212.40
Hurricane				
Small	NA	NA	NA	NA
Medium	NA	NA	NA	NA
Large	122	122	337.94	1,032.12
TOTAL	122	122	337.94	1,032.12
Hurricane Fault				
Small	1,012	856	1,138.48	8,763.92
Medium	743	321	677.31	7,132.80
Large	NA	NA	NA	NA
TOTAL	1,755	1,177	1,815.79	15,896.72
Hurricane Mesa				
Small	NA	NA	NA	NA
Medium	225	222	468.42	2,160.00
Large	NA	NA	NA	NA
TOTAL	225	222	468.42	2,160.00
Jackson Wash				
Small	NA	NA	NA	NA
Medium	1,682	1,673	3,530.03	16,147.20
Large	NA	NA	NA	NA
TOTAL	1,682	1,673	3,530.03	16,147.20
Land Hill				
Small	60	45	59.85	519.60
Medium	NA	NA	NA	NA
Large	NA	NA	NA	NA
TOTAL	60	45	59.85	519.60

[a]Based on 1976 licensed use AUMs by scale of operation: small = 1.33, medium = 2.11, and large = 2.77.
[b]Based on Base Property Qualifications AUMs by scale of operation: small = 8.66, medium = 9.60, large 8.46.
[c]Sheep values have been converted to equivalent cattle rates because of insufficient data.
NA = Not applicable

(continued)

APPENDIX XIX (continued)

Proposed Allotment	Base Property Qualifications (AUMs)	1976 Licensed Use (AUMs)	Annual[a] Income (AUM)	Capital[b] Value (AUM)
Little Creek				
Small	NA	NA	NA	NA
Medium	641	448	945.28	6,153.60
Large	NA	NA	NA	NA
TOTAL	641	448	945.28	6,153.60
Mesa				
Small	90	20	26.60	779.40
Medium	NA	NA	NA	NA
Large	NA	NA	NA	NA
TOTAL	90	20	26.60	779.40
Minera Wash				
Small	48	48	63.84	415.68
Medium	96	36	75.96	921.60
Large	111	111	307.47	939.06
TOTAL	255	195	447.27	2,276.34
Pintura Seeding				
Small	63	28	37.24	545.58
Medium	NA	NA	NA	NA
Large	NA	NA	NA	NA
TOTAL	63	28	37.24	545.58
Red Cliffs				
Small	342	168	223.44	2,961.72
Medium	NA	NA	NA	NA
Large	440	138	382.26	3,722.40
TOTAL	782	306	605.70	6,684.12
Sand Mountain				
Small	NA	NA	NA	NA
Medium	744	598	1,261.78	7,142.40
Large	1,556	1,437	3,980.49	13,163.76
TOTAL	2,300	2,035	5,252.27	20,306.16

[a]Based on 1976 licensed use AUMs by scale of operation: small = 1.33, medium = 2.11, and large = 2.77.
[b]Based on Base Property Qualifications AUMs by scale of operation: small = 8.66, medium = 9.60, large 8.46.
[c]Sheep values have been converted to equivalent cattle rates because of insufficient data.
NA = Not applicable

(continued)

APPENDIX XIX (continued)

Proposed Allotment	Base Property Qualifications (AUMs)	1976 Licensed Use (AUMs)	Annual[a] Income (AUM)	Capital[b] Value (AUM)
Sandstone Mountain				
Small	NA	NA	NA	NA
Medium	NA	NA	NA	NA
Large	114	114	315.78	964.44
TOTAL	114	114	315.78	964.44
Santa Clara Creek				
Small	117	117	155.61	1,013.22
Medium	NA	NA	NA	NA
Large	NA	NA	NA	NA
TOTAL	117	117	155.61	1,013.22
Scarecrow Peak				
Small	247	164	218.12	2,139.02
Medium	316	320	675.20	3,033.60
Large	1,683	1,227	3,398.79	14,238.18
TOTAL	2,246	1,711	4,292.29	19,410.80
Short Creek				
Small	288	291	387.03	2,494.08
Medium	228	111	234.21	2,188.80
Large	NA	NA	NA	NA
TOTAL	516	402	621.24	4,682.88
Smith Mesa				
Small	144	144	191.52	1,247.04
Medium	NA	NA	NA	NA
Large	NA	NA	NA	NA
TOTAL	144	144	191.52	1,247.04
Toquerville				
Small	318	273	363.09	2,753.88
Medium	74	74	156.14	710.40
Large	NA	NA	NA	NA
TOTAL	392	347	519.23	3,464.28

[a]Based on 1976 licensed use AUMs by scale of operation: small = 1.33, medium = 2.11, and large = 2.77.
[b]Based on Base Property Qualifications AUMs by scale of operation: small = 8.66, medium = 9.60, large 8.46.
[c]Sheep values have been converted to equivalent cattle rates because of insufficient data.
NA = Not applicable

(continued)

APPENDIX XIX (continued)

Proposed Allotment	Base Property Qualifications (AUMs)	1976 Licensed Use (AUMs)	Annual[a] Income (AUM)	Capital[b] Value (AUM)
Trail				
Small	110	110	146.30	952.60
Medium (sheep)	130	63	26.59[c]	249.60[c]
Large	NA	NA	NA	NA
TOTAL	240	173	172.89	1,202.20
Twin Peaks				
Small	NA	NA	NA	NA
Medium	1,428	390	822.90	13,708.80
Large	NA	NA	NA	NA
TOTAL	1,428	390	822.90	13,708.80
Veyo				
Small	NA	NA	NA	NA
Medium	232	73	154.03	2,227.20
Large	110	114	315.78	930.60
TOTAL	342	187	469.81	3,157.80
Virgin				
Small	68	68	90.44	588.88
Medium	183	184	388.24	1,756.80
Large	NA	NA	NA	NA
TOTAL	251	252	478.68	2,345.68
Warner Ridge				
Small	64	65	86.45	554.24
Medium	NA	NA	NA	NA
Large	NA	NA	NA	NA
TOTAL	64	65	86.45	554.24
Washington				
Small	248	248	329.84	2,147.68
Medium	NA	NA	NA	NA
Large	NA	NA	NA	NA
TOTAL	248	248	329.84	2,147.68

[a]Based on 1976 licensed use AUMs by scale of operation: small = 1.33, medium = 2.11, and large = 2.77.
[b]Based on Base Property Qualifications AUMs by scale of operation: small = 8.66, medium = 9.60, large 8.46.
[c]Sheep values have been converted to equivalent cattle rates because of insufficient data.
NA = Not applicable

(continued)

APPENDIX XIX (continued)

Proposed Allotment	Base Property Qualifications (AUMs)	1976 Licensed Use (AUMs)	Annual Income (AUM)[a]	Capital Value (AUM)[b]
White Dome				
Small	35	35	46.55	303.10
Medium	NA	NA	NA	NA
Large	NA	NA	NA	NA
TOTAL	35	35	46.55	303.10
CUSTODIAL				
Airport				
Small	9	9	11.97	77.94
Medium	NA	NA	NA	NA
Large	NA	NA	NA	NA
TOTAL	9	9	11.97	77.94
Black Canyon				
Small	15	15	19.95	129.90
Medium	NA	NA	NA	NA
Large	NA	NA	NA	NA
TOTAL	15	15	19.95	129.90
Box Canyon				
Small	NA	NA	NA	NA
Medium	48	48	101.28	460.80
Large	NA	NA	NA	NA
TOTAL	48	48	101.28	480.80
Cinder Mountain				
Small	NA	NA	NA	NA
Medium	NA	NA	NA	NA
Large	154	154	426.58	1,302.84
TOTAL	154	154	426.58	1,302.84
Dalton Wash				
Small	33	33	43.89	285.78
Medium	NA	NA	NA	NA
Large	NA	NA	NA	NA
TOTAL	33	33	43.89	285.78

[a]Based on 1976 licensed use AUMs by scale of operation: small = 1.33, medium = 2.11, and large = 2.77.
[b]Based on Base Property Qualifications AUMs by scale of operation: small = 8.66, medium = 9.60, large 8.46.
[c]Sheep values have been converted to equivalent cattle rates because of insufficient data.
NA = Not applicable

(continued)

APPENDIX XIX (continued)

Proposed Allotment	Base Property Qualifications (AUMs)	1976 Licensed Use (AUMs)	Annual[a] Income (AUM)	Capital[b] Value (AUM)
Lamoreaux				
Small	NA	NA	NA	NA
Medium	NA	NA	NA	NA
Large	55	8	22.16	45.30
TOTAL	55	8	22.16	45.30
Little Plain				
Small	60	60	79.80	519.60
Medium	NA	NA	NA	NA
Large	NA	NA	NA	NA
TOTAL	60	60	79.80	519.60
North Grafton				
Small	31	.....	....	268.46
Medium	NA	NA	NA	NA
Large	NA	NA	NA	NA
TOTAL	31	.....	....	268.46
Red Butte				
Small	126	40	53.20	1,091.16
Medium	NA	NA	NA	NA
Large	NA	NA	NA	NA
TOTAL	126	40	53.20	1,091.16
Rock Spring				
Small	NA	NA	NA	NA
Medium	NA	NA	NA	NA
Large	85	85	235.45	719.10
TOTAL	85	85	235.45	719.10
Sand Hills				
Small	NA	NA	NA	NA
Medium	110	110	232.10	1,056.00
Large	NA	NA	NA	NA
TOTAL	110	110	232.10	1,056.00

[a]Based on 1976 licensed use AUMs by scale of operation: small = 1.33, medium = 2.11, and large = 2.77.
[b]Based on Base Property Qualifications AUMs by scale of operation: small = 8.66, medium = 9.60, large 8.46.
[c]Sheep values have been converted to equivalent cattle rates because of insufficient data.
NA = Not applicable

(continued)

APPENDIX XIX (concluded)

Proposed Allotment	Base Property Qualifications (AUMs)	1976 Licensed Use (AUMs)	Annual Income[a] (AUM)	Capital Value[b] (AUM)
Sand Wash Reservoir				
Small	NA	NA	NA	NA
Medium	41	41	86.51	393.60
Large	NA	NA	NA	NA
TOTAL	41	41	86.51	393.60
Stout				
Small	19	14	18.62	164.54
Medium	NA	NA	NA	NA
Large	NA	NA	NA	NA
TOTAL	19	14	18.62	164.54
Yellow Knolls				
Small	123	59	78.47	1,056.52
Medium	NA	NA	NA	NA
Large	NA	NA	NA	NA
TOTAL	123	59	78.47	1,056.52
LaVerkin				
Small	NA	NA	NA	NA
Medium	NA	NA	NA	NA
Large	99	99	274.23	837.54
TOTAL	99	99	274.23	837.54
TOTALS				
Small	6,719	4,976	6,394.64	56,723.00
Medium	12,911	9,929	20,675.05	120,136.32
Large	9,275	4,761	12,761.39	78,466.50
TOTAL	28,905	19,666	39,831.08	255,325.82

[a]Based on 1976 licensed use AUMs by scale of operation: small = 1.33, medium = 2.11, and large = 2.77.
[b]Based on Base Property Qualifications AUMs by scale of operation: small = 8.66, medium = 9.60, large 8.46.
[c]Sheep values have been converted to equivalent cattle rates because of insufficient data.
NA = Not applicable

APPENDIX XX

Impact Summary

Allotment	Pastures	Erosion Short-Term	Erosion Long-Term	Infiltration Short-Term	Infiltration Long-Term
INTENSIVE MANAGEMENT					
Alger Hollow	All	Plus	Plus	Plus	Plus
Apex Slope	Winter	Minus	Minus	Minus	Minus
	Spring	Plus	Plus	Plus	Plus
Beaver Dam Slope	All	Minus	Plus	Minus	Plus
Big Mountain	All	Plus	Plus	Plus	Plus
Boomer Hill	All	Minus	Plus	Minus	Plus
Boot Spring	All	Plus	Plus	None	None
Bull Mountain	All	Plus	Plus	Plus	Plus
Central	All	Plus	Plus	Plus	Plus
Coalpits	All except Fault & private	Plus	Plus	Plus	Plus
Cougar Canyon	All	None	Plus	None	Plus
Curly Hollow	All	Minus	Plus	Minus	Plus
Dagget Flat	All	Minus	Minus	None	None
Desert Inn	Deferred	Plus	Plus	None	None
	All other	Plus	Plus	Plus	Plus
Dome	All	Plus	Plus	Plus	Plus
Fort Pierce	All	Minus	None	Minus	None
Gooseberry	All	Plus	Plus	Plus	Plus
Grafton	All	Plus	Plus	Plus	Plus
Gunlock	All	Plus	Plus	Plus	Plus
Herd House	All except custodial	Plus	Plus	Plus	Plus
Hurricane	All except custodial	Plus	Plus	Plus	Plus
Hurricane Fault	All	Plus	Plus	Plus	Plus
Hurricane Mesa	All except custodial	Plus	Plus	Plus	Plus
Jackson Wash	Jackson Wash & Pahcoon	Plus	Plus	Plus	Plus
	Seeding	Minus	Minus	Minus	Minus
Land Hill	All	Plus	Plus	Plus	Plus
Little Creek	All	Minus	Plus	Minus	Plus
Mesa	All except custodial	Plus	Plus	Plus	Plus
Minera Wash	All	Plus	Plus	Plus	Plus
Red Cliffs	All	Plus	Plus	Plus	Plus

(continued)

APPENDIX XX (continued)

Allotment	Pastures	Erosion Short-Term	Erosion Long-Term	Infiltration Short-Term	Infiltration Long-Term
Sand Mountain	All	Plus	Plus	Plus	Plus
Sandstone Mountain	All	Plus	Plus	Plus	Plus
Santa Clara Creek	All	Plus	Plus	Plus	Plus
Scarecrow Peak	All except custodial	Plus	Plus	Plus	Plus
Short Creek	All	Minus	Plus	Minus	Plus
Smith Mesa	All	None	None	None	None
Toquerville	All	Plus	Plus	Plus	Plus
Trail	All	Minus	Plus	Plus	Plus
Twin Peaks	All	Minus	Plus	Minus	Plus
Veyo	All	Plus	Plus	Plus	Plus
Virgin	All except custodial	Plus	Plus	Plus	Plus
Washington	All	Plus	Plus	Plus	Plus
White Dome	All except custodial	Minus	Plus	Minus	Plus
CUSTODIAL					
Airport	All	Plus	Plus	Plus	Plus
Black Canyon	All	Minus	Minus	None	None
Box Canyon	All	Minus	Minus	None	None
Cinder Mountain	All	Plus	Plus	Plus	Plus
Dalton Wash	All	Minus	Minus	None	None
Fault	Custodial	None	None	None	None
Herd House	Custodial	Minus	Minus	Minus	Minus
Hurricane	Custodial	Minus	Minus	Minus	Minus
Hurricane Mesa	Custodial	Minus	Minus	Minus	Minus
Lamoreaux	All	None	None	None	None
Little Plain	All	Plus	Plus	Plus	Plus
Mesa	Custodial	None	None	None	None
North Grafton	All	Minus	Minus	Minus	Minus
Red Butte	All	None	None	None	None
Rock Spring	All	Plus	Plus	Plus	Plus
Sand Hills	All	None	None	None	None
Sand Wash Reservoir	All	None	None	None	None
Scarecrow Peak	Custodial	Minus	Minus	Minus	Minus
Stout	All	Plus	Plus	Plus	Plus
Virgin	Custodial	Plus	Plus	Plus	Plus
White Dome	Custodial	Minus	Minus	Minus	Minus
Yellow Knolls	All	None	None	None	None

(continued)

APPENDIX XX (concluded)

Allotment	Pastures	Erosion Short-Term	Erosion Long-Term	Infiltration Short-Term	Infiltration Long-Term
ELIMINATION OF GRAZING					
LaVerkin Creek	All	Plus	Plus	Plus	Plus
Pace Knoll	All	Plus	Plus	Plus	Plus
Pintura	All	Plus	Plus	Plus	Plus

APPENDIX XXI

Impacts to Vegetation from Grazing

General Impacts. Vegetation can be impacted directly or indirectly by grazing. Direct impacts result from removal of part or all of a plant from its support and/or plant destruction from trampling.

Indirect impacts result from action that changes the availability of the life supporting substances, water, soil, air, and sunlight or actions which change the plants' ability to compete for these substances. For example, grazing could remove the vegetation production that ordinarily falls to the soil surface and becomes litter. The absence of litter reduces soil protection, increases surface temperature, decreases water infiltration, reduces organic matter and soil fertility. These factors tend to reduce the ability of the plant to complete its normal life cycle. All plants in a given vegetation community compete with each other for these life supporting substances. Usually, a given area of soil will support a fairly constant volume of herbage based upon the limiting supporting substance. Any agent that impairs one plant but not another or changes the ability of these plants to compete for the supporting substances may result in a change in the plant composition. Total herbage may remain the same.

A good example of this is selective grazing by animals. They select the most palatable plants first, thus reducing the plants' ability to compete with the less palatable plants. The intensity of domestic livestock grazing has a great effect on how selective the animals are. A greater concentration of animals in a smaller area for a shorter time tends to limit natural selection.

Other impacts on vegetation vary depending upon the number and kind of animals grazed, the length of time and season they are allowed to graze, and how they are distributed on the range. In general, plants are most severely impacted when grazed during the spring growing period. This is when plants draw heavily from carbohydrate root reserves to initiate growth and produce new vegetative shoots. After initial growth has produced considerable leaf area, carbohydrates are synthesized in

excess of growth requirements. The plant then begins to store the excess. Carbohydrate reserves are the lowest for most plants when they are growing most rapidly. Grazing or removal of green, leafy material at this time is most harmful because the plants must again draw on root reserves to produce photosynthetic material. Additional grazing or removal of plant material during the growing season results in additional withdrawal of root reserves. This reduces the capacity of the plant to produce both shoot and root growth the following year. If this continues, plants are seriously weakened and eventually die.

Grazing when plants are in the process of flowering and developing seed limits seed production and new seedlings the following year. Young seedlings are pulled up when grazed in the early spring before they have had the opportunity to develop adventitious roots which help anchor the plant to the soil.

Range managers over the past century have tried many different grazing systems in an attempt to realize the greatest animal gains while maintaining or improving range forage. Arthur W. Sampson (1913) indicates that season-long grazing seriously interferes with plant growth and resulted in weakened plants, little or no seed, and a gradual decline in grazing capacity. He further indicates that deferred grazing until after seed ripe has a great advantage in producing new seedlings, much superior to season-long grazing and no grazing at all.

L.H. Douglas (1915) reported that grazing after seed ripe produced 100 percent more vegetation than adjacent range grazed moderately during the growing season and 20 percent more than range not grazed at all.

E.J. Dyksterhuis (1949) indicated that there are certain advantages for grazing twice as many animals on half the pasture in order to provide rest. Gerald W. Thomas and Vernon A. Young (1954) reported that a seasonal rotation grazing system under heavy grazing resulted in serious reductions in vegetational density. They concluded that it is very important to design a grazing system that provides rest for one pasture during the critical spring growing period each year. Other experiments (Claude C. Dellon, 1958) indicated benefits of a rotation deferred grazing system are:

1. Better distribution of livestock
2. Better utilization of forage
3. Great increases in grazing capacity
4. Greater livestock gain

A report by E.J. Woolfolk (1960) indicates that rest rotation grazing systems minimizes the effect of drought on pastures. Experiments with rest rotation grazing (A.L. Hormay 1970) indicate that ranges will respond favorably to a system that provides rest during the growing season, heavy use after seed ripe, and rest after the seedling appear. According to the results of studies in western Utah (Cook, 1971), continuous defoliation in excess of 75 percent of the current growth was too severe for the species studied (sagebrush, saltbush, squirreltail, and Indian ricegrass) regardless of the season when defoliated. These reports indicate the need to design a grazing system that considers the needs of the plant to complete its growing cycle in such a manner as to result in viable seed being produced and planted.

APPENDIX XXII

Method of Determining AUMs of Possible Livestock Forage Production

In order to develop a scale of difference for impact analysis of the proposed action on vegetation, comparative rates of Animal Unit Month (AUM) change by proposed allotments over a 24-year time frame were used.

It was assumed:

1. On those allotments where implementation of the proposed action would result in a good chance of the vegetation increasing to the potential livestock forage production within the time frame, the increase was shown to be the potential.

2. Where implementation would result in a fair chance of reaching the potential, 75 percent of the increased production was considered attainable.

3. If implementation would result in a poor chance of reaching the potential, 50 percent of the potential was considered attainable.

4. If implementation resulted in a reduction of production, 15 percent of the present rated carrying capacity was subtracted to show the anticipated reduction.

The results of the percentage difference shown are a comparison between the possible production level and the potential production in 24 years.

This method facilitates comparison by differentiating the magnitude of an impact. As an example, a negative impact results in not attaining the potential level of forage production in 24 years. In the context of its use, the method of determining AUMs is valid since it was uniformly applied to each allotment and evaluated similar factors.

APPENDIX XXIII

Vegetation Affected by Proposed Range Developments

	Seeding		Fence		Cattleguards		Wells		Catchments		Reservoir		Pipelines		Trail		Springs		Tanks	
	Acres	Acre Loss	Miles	Acre Loss	No.	Acre Loss	No.	Acre Loss	No.	Acre Loss	No.	Acre Loss	Miles	Acre Loss	Miles	Acre Loss	No.	Acre Loss	No.	Acre Loss
Alger Hollow	800	.....	3.1	....	1	....	...	...	1	...	...	...	2.2	....	...	....	...	....	...	...
Short term	.....	800	....	3.7	...	0.02	...	...	...	1	...	...	....	2.2	...	....	...	....	...	...
Long term	.....	800	....	0	...	0.02	...	...	...	1	...	...	....	0	...	....	...	....	...	...
Apex Slope	.....	.....	2.2	....	...	....	...	...	...	...	...	...	....	....	...	....	...	....	...	...
Short term	.....	.....	....	2.6	...	....	...	...	...	...	...	...	....	....	...	....	...	....	...	...
Long term	.....	.....	....	0	...	....	...	...	...	...	...	...	....	....	...	....	...	....	...	...
Beaver Dam Slope	.....	.....	....	....	...	....	...	...	1	...	...	...	5.0	....	...	....	...	....	...	...
Short term	.....	.....	....	....	...	....	...	...	...	1	...	...	....	5.0	...	....	...	....	...	...
Long term	.....	.....	....	....	...	....	...	...	...	1	...	...	....	0	...	....	...	....	...	...
Big Mountain	.....	.....	2.0	....	...	....	...	...	...	...	...	...	....	....	...	....	2	....	...	...
Short term	.....	.....	....	2.4	...	....	...	...	...	...	...	...	....	....	...	....	...	2.0	...	...
Long term	.....	.....	....	0	...	....	...	...	...	...	...	...	....	....	...	....	...	0	...	...
Boomer Hill	.....	.....	1.6	....	...	....	...	...	...	...	...	...	....	....	...	....	...	....	...	...
Short term	.....	.....	....	1.8	...	....	...	...	...	...	...	...	....	....	...	....	...	....	...	...
Long term	.....	.....	....	0	...	....	...	...	...	...	...	...	....	....	...	....	...	....	...	...
Boot Spring	.....	.....	0.4	....	...	....	...	...	...	...	...	...	0.6	....	...	....	1	....	1	...
Short term	.....	.....	....	0.6	...	....	...	...	...	...	...	...	....	0.6	...	....	...	0.25	...	.2
Long term	.....	.....	....	0	...	....	...	...	...	...	...	...	....	0	...	....	...	0	...	.2
Bull Mountain	.....	.....	0.2	....	...	....	...	...	...	...	...	...	....	....	...	....	...	....	...	...
Short term	.....	.....	....	0.4	...	....	...	...	...	...	...	...	....	....	...	....	...	....	...	...
Long term	.....	.....	....	0	...	....	...	...	...	...	...	...	....	....	...	....	...	....	...	...
Central	.....	.....	2.0	....	3	....	...	...	...	...	...	...	....	....	...	....	...	....	...	...
Short term	.....	.....	....	2.4	...	0.06	...	...	...	...	...	...	....	....	...	....	...	....	...	...
Long term	.....	.....	....	0	...	0.06	...	...	...	...	...	...	....	....	...	....	...	....	...	...
Coalpits and Fault	.....	.....	1.5	....	...	....	...	...	...	...	1	...	....	....	...	....	...	....	...	...
Short term	.....	.....	....	1.8	...	....	...	...	...	...	...	3	....	....	...	....	...	....	...	...
Long term	.....	.....	....	0	...	....	...	...	...	...	...	1	....	....	...	....	...	....	...	...
Cougar Canyon	.....	.....	1.5	....	...	....	...	...	...	...	...	...	....	....	...	....	2	....	...	...
Short term	.....	.....	....	1.8	...	....	...	...	...	...	...	...	....	....	...	....	...	0.5	...	...
Long term	.....	.....	....	0	...	....	...	...	...	...	...	...	....	....	...	....	...	0	...	...

(continued)

APPENDIX XXIII (continued)

	Seeding		Fence		Cattleguards		Wells		Catchments		Reservoir		Pipelines		Trail		Springs		Tanks	
	Acres	Acre Loss	Miles	Acre Loss	No.	Acre Loss	No.	Acre Loss	No.	Acre Loss	No.	Acre Loss	Miles	Acre Loss	Miles	Acre Loss	No.	Acre Loss	No.	Acre Loss
Curly Hollow	.....	.....	0.9	....	...	....	...	...	1	...	...	...	2.9	....	...	....	...	....	3	...
Short term	.....	.....	....	1.0	...	....	...	...	...	1	...	...	....	2.9	...	....	...	....	...	.6
Long term	.....	.....	....	0	...	....	...	...	...	1	...	...	....	0	...	....	...	....	...	.6
Dagget Flat	.....	.....	1.5	....	...	....	...	...	...	...	...	...	0.4	....	...	....	3	....	...	...
Short term	.....	.....	....	2.0	...	....	...	...	...	...	...	...	....	0.4	...	....	...	0.75	...	...
Long term	.....	.....	....	0	...	....	...	...	...	...	...	...	....	0	...	....	...	0	...	...
Desert Inn	.....	.....	0.5	....	...	....	...	...	1	...	1	...	2.0	....	...	....	...	....	1	...
Short term	.....	.....	....	0.7	...	....	...	...	...	1	...	3	....	2.0	...	....	...	....	...	.2
Long term	.....	.....	....	0	...	....	...	...	...	1	...	1	....	0	...	....	...	....	...	.2
Dome	.....	.....	1.0	....	...	....	...	...	...	...	...	...	....	....	...	....	1	....	...	...
Short term	.....	.....	....	1.2	...	....	...	...	...	...	...	...	....	....	...	....	...	0.25	...	...
Long term	.....	.....	....	0	...	....	...	...	...	...	...	...	....	....	...	....	...	0	...	...
Fort Pierce	.....	.....	6.5	....	2	....	...	...	...	...	...	...	9.8	....	...	....	...	....	...	...
Short term	.....	.....	....	7.8	...	0.04	...	...	...	...	...	...	....	9.8	...	....	...	....	...	...
Long term	.....	.....	....	0	...	0.04	...	...	...	...	...	...	....	0	...	....	...	0	...	...
Gooseberry	.....	.....	1.1	....	...	....	...	...	...	...	1	...	....	....	0.1	....	...	....	...	...
Short term	.....	.....	....	1.4	...	....	...	...	...	...	...	3	....	....	...	0.05	...	....	...	...
Long term	.....	.....	....	0	...	....	...	...	...	...	...	1	....	....	...	0.03	...	....	...	...
Grafton	.....	.....	2.5	....	...	....	...	...	...	...	...	...	....	....	...	....	1	....	...	...
Short term	.....	.....	....	3.0	...	....	...	...	...	...	...	...	....	....	...	....	...	0.25	...	...
Long term	.....	.....	....	0	...	....	...	...	...	...	...	...	....	....	...	....	...	0	...	...
Gunlock	.....	.....	1.7	....	1	....	...	...	...	...	...	...	....	....	...	....	...	....	...	...
Short term	.....	.....	....	2.0	...	0.02	...	...	...	...	...	...	....	....	...	....	...	....	...	...
Long term	.....	.....	....	0	...	0.02	...	...	...	...	...	...	....	....	...	....	...	....	...	...
Hurricane	.....	.....	2.0	....	...	....	...	...	...	...	...	...	....	....	...	....	...	....	...	...
Short term	.....	.....	....	2.4	...	....	...	...	...	...	...	...	....	....	...	....	...	....	...	...
Long term	.....	.....	....	0	...	....	...	...	...	...	...	...	....	....	...	....	...	....	...	...
Hurricane Fault	.....	.....	3.5	....	...	....	...	...	1	...	...	...	2.1	....	...	....	...	....	...	...
Short term	.....	.....	....	4.2	...	....	...	...	...	1	...	...	....	2.1	...	....	...	....	...	...
Long term	.....	.....	....	0	...	....	...	...	...	1	...	...	....	0	...	....	...	....	...	...
Jackson Wash	2,000	.....	6.7	....	...	....	...	...	1	...	1	...	....	....	...	....	1	....	...	...
Short term	.....	2,000	....	8.0	...	....	...	...	...	1	...	3	....	....	...	....	...	0.25	...	...
Long term	.....	1,000	....	0	...	....	...	...	...	1	...	1	....	....	...	....	...	0	...	...

(continued)

APPENDIX XXIII (continued)

	Seeding		Fence		Cattleguards		Wells		Catchments		Reservoir		Pipelines		Trail		Springs		Tanks	
	Acres	Acre Loss	Miles	Acre Loss	No.	Acre Loss	No.	Acre Loss	No.	Acre Loss	No.	Acre Loss	Miles	Acre Loss	Miles	Acre Loss	No.	Acre Loss	No.	Acre Loss
Little Creek	1,800	.....	....	....	2	....	...	...	...	...	3	...	....	....	...	....	...	....	...	...
Short term	.....	1,800	....	....	...	0.04	...	...	...	...	...	9	....	....	...	....	...	....	...	...
Long term	.....	0	....	....	...	0.04	...	...	...	...	...	3	....	....	...	....	...	....	...	...
Minera Wash	.....	.....	3.1	....	...	....	...	...	...	...	...	...	....	....	...	....	1	....	...	...
Short term	.....	.....	....	3.7	...	....	...	...	...	...	...	...	....	....	...	....	...	0.25	...	...
Long term	.....	.....	....	0	...	....	...	...	...	...	...	...	....	....	...	....	...	0	...	...
Red Cliffs	.....	.....	1.3	....	4	....	...	...	...	...	...	...	1.3	....	...	....	...	....	1	...
Short term	.....	.....	....	1.6	...	0.08	...	...	...	...	...	...	....	1.3	...	....	...	....	...	.2
Long term	.....	.....	....	0	...	0.08	...	...	...	...	...	...	....	0	...	....	...	....	...	.2
Sand Mountain	.....	.....	7.0	....	3	....	...	...	...	...	...	...	11.0	....	...	....	...	....	...	...
Short term	.....	.....	....	8.6	...	0.06	...	...	...	...	...	...	....	11.0	...	....	...	....	...	...
Long term	.....	.....	....	0	...	0.06	...	...	...	...	...	...	....	0	...	....	...	....	...	...
Scarecrow Peak	.....	.....	5.0	....	...	....	2	...	1	...	...	...	3.5	....	...	....	...	....	...	...
Short term	.....	.....	....	6.1	...	....	...	0.5	...	1	...	...	....	3.5	...	....	...	....	...	...
Long term	.....	.....	....	0	...	....	...	0.2	...	1	...	...	....	0	...	....	...	....	...	...
Short Creek	.....	.....	2.8	....	...	....	...	...	...	...	...	...	1.5	....	...	....	1	....	...	...
Short term	.....	.....	....	2.4	...	....	...	...	...	...	...	...	....	1.5	...	....	...	0.25	3	.6
Long term	.....	.....	....	0	...	....	...	...	...	...	...	...	....	0	...	....	...	0	...	.6
Toquerville	.....	.....	0.5	....	...	....	...	...	...	...	...	...	....	....	...	....	...	....	3	...
Short term	.....	.....	....	0.6	...	....	...	...	...	...	...	...	....	....	...	....	...	....	...	1.6
Long term	.....	.....	....	0	...	....	...	...	...	...	...	...	....	....	...	....	...	....	...	1.6
Trail	.....	.....	1.3	....	...	....	...	...	...	...	...	...	....	....	...	....	...	....	...	...
Short term	.....	.....	....	1.8	...	....	...	...	...	...	...	...	....	....	...	....	...	....	...	...
Long term	.....	.....	....	0	...	....	...	...	...	...	...	...	....	....	...	....	...	....	...	...
Twin Peaks	480	.....	5.0	....	1	...	...	...	...	...	1	...	2	....	...	....	5	....	1	...
Short term	.....	480	....	6.0	...	0.02	...	...	...	...	...	3	....	2	...	....	...	1.3	...	.2
Long term	.....	480	....	0	...	0.02	...	...	...	...	...	1	....	0	...	....	...	0	...	.2
Veyo	.....	.....	0.3	....	1	....	...	...	...	...	...	...	....	....	...	....	...	...	...	...
Short term	.....	.....	....	0.4	...	0.02	...	...	...	...	...	...	....	....	...	....	...	....	...	...
Long term	.....	.....	....	0	...	0.02	...	...	...	...	...	...	....	....	...	....	...	....	...	...
Virgin	.....	.....	2.8	....	1	....	...	...	...	...	...	...	....	....	...	....	...	....	...	...
Short term	.....	.....	....	3.4	...	0.02	...	...	...	...	...	...	....	....	...	....	...	....	...	...
Long term	.....	.....	....	0	...	0.02	...	...	...	...	...	...	....	....	...	....	...	....	...	...

(continued)

APPENDIX XXIII (concluded)

	Seeding		Fence		Cattleguards		Wells		Catchments		Reservoir		Pipelines		Trail		Springs		Tanks	
	Acres	Acre Loss	Miles	Acre Loss	No.	Acre Loss	No.	Acre Loss	No.	Acre Loss	No.	Acre Loss	Miles	Acre Loss	Miles	Acre Loss	No.	Acre Loss	No.	Acre Loss
Washington	.....	.....	1.7	....	...	....	...	...	...	...	...	...	....	....	...	....	...	....	...	...
Short term	.....	.....	....	2.0	...	....	...	...	...	...	...	...	....	....	...	....	...	....	...	...
Long term	.....	.....	....	0	...	....	...	...	...	...	...	...	....	....	...	....	...	....	...	...
White Dome	.....	.....	2	....	...	....	...	...	...	...	...	...	....	....	...	....	...	....	2	...
Short term	.....	.....	....	2.5	...	....	...	...	...	...	...	...	....	....	...	....	...	....	...	.4
Long term	.....	.....	....	0	...	....	...	...	...	...	...	...	....	....	...	....	...	....	...	.4
TOTALS	5,080	.....	75.2	....	19	....	2	...	7	...	8	...	44.3	....	0.1	....	18	....	20	...
Short term	.....	5,080	....	90.3	...	0.4	...	0.5	...	7	...	24	....	44.3	...	0.05	...	4.5	...	.4
Long term	.....	2,280	....	0	...	0.4	...	0.2	...	7	...	8	....	0	...	0.03	...	0	...	.4

APPENDIX XXIV

Archaeological Sites in Areas of Proposed Developments

Allotment	Site Number	Type and Condition of Site	Proposed Development	CRES Rating
Alger Hollow	HD42Ws16	Flaking station; good	Fence	S2
Fort Pierce	42Ws440	Flaking station; undisturbed	Fence	S3
	42Ws520	Petroglyphs; undisturbed	Fence	S3
Gunlock	42s360	Virgin-Kayenta Anasazi habitation site; badly vandalized	Fence	S3
Little Creek Mountain	HD42Ws78	Virgin-Kayenta Anasazi habitation site; vandalized	Chaining	S3
	HD42Ws79	Virgin-Kayenta Anasazi flaking station; undisturbed	Chaining	S2
	HD42Ws80	Virgin-Kayenta Anasazi habitation site; undisturbed	Chaining	S2
	HD42Ws81	Virgin-Kayenta Anasazi habitation site; vandalized	Chaining	S3
	HD42Ws82	Virgin-Kayenta Anasazi habitation site; vandalized	Chaining	S3
	HD42Ws83	Virgin-Kayenta Anasazi campsite; undisturbed	Chaining	S2
	HD42Ws84	Virgin-Kayenta Anasazi habitation site; undisturbed	Chaining	S2
	HD42Ws85	Virgin-Kayenta Anasazi campsite; slightly disturbed	Chaining	S3
	HD42Ws86	Virgin-Kayenta Anasazi habitation site	Chaining	S2

(continued)

APPENDIX XXIV (concluded)

Allotment	Site Number	Type and Condition of Site	Proposed Development	CRES Rating
	HD42Ws87	Virgin-Kayenta Anasazi campsite; slightly eroded	Chaining	S2
	HD42Ws88	Flaking station	Chaining	S3

APPENDIX XXV

Distribution of Existing Fish Populations and Potential Game Fish Habitat

	STREAMS													
Fish Species	Virgin River	Beaver Dam Wash	Santa Clara River	Beaver Dam Wash (west fork)	Sheep Canyon	Beaver Dam Wash (east fork)	Fort Pierce	LaVerkin Creek	North Creek	Leeds Creek	Magotsu Creek	Gunlock Reservoir	Pacoon Spring	Ash Creek
Threadfin Shad	...	...	...	...	...	...	...	...	...	...	...	X	...	...
Brown Trout	...	...	X	...	...	...	...	...	...	...	...	...	...	...
Rainbow Trout	...	...	X	X	X	...	...	...	...	X	...	...	...	...
Brook Trout	...	...	X	...	...	...	...	...	...	...	...	...	...	...
Speckled Dace	X	X	X	X	...	X	X	...	X	X	X	...	...	X
Golden Shiner	...	...	...	...	...	...	...	...	...	...	...	X	...	...
Roundtail Chub	X	...	...	...	...	...	...	...	...	...	...	...	...	...
Redside Shiner	...	...	...	...	...	...	...	...	...	...	...	X	...	...
Virgin River Spinedace	X	...	X	X	...	X	...	X	X	X	...	...	...	...
Woundfin	X	...	...	...	...	...	...	X	...	...	...	...	...	...
Goldfish	...	...	...	...	...	...	...	...	...	...	...	...	X	...
Mountain Sucker	X	...	...	...	...	...	...	...	...	...	...	...	...	...
Flannelmouth Sucker	X	...	X	...	...	...	...	X	X	X	...	...	...	X
Desert Sucker	X	...	X	X	...	X	X	...	X	X	...	...	...	...
Black Bullhead	...	...	...	...	...	...	...	...	...	...	...	X	...	...
Gambusia	X	...	...	...	...	...	...	...	...	...	...	...	...	...
Largemouth Bass	...	...	X	...	...	...	...	...	...	...	...	X	...	...
Green Sunfish	X	...	...	...	...	...	...	...	...	...	...	...	...	...
Crappie	...	...	...	...	...	...	...	...	...	...	...	X	...	...
Bluegill	X	...	...	...	...	...	...	...	...	...	...	...	...	...
Potential Game Fish Habitat	...	...	X	X	X	...	...	...	...	X	...	X	...	...

APPENDIX XXVI

Allotment Percentages Proposed for Disposal in Management Framework Plan

Allotment	Total AUMs	Percentage	Affected AUMs
Alger Hollow	872	10	87
Boomer Hill	138	19	26
Curly Hollow	1,056	3	36
Dome	120	7	8
Grafton	128	5	7
Herd House	105	91	96
Land Hill	39	79	31
Red Cliffs	376	57	214
Sand Mountain	1,477	3	40
Sandstone Mountain	93	6	6
Santa Clara Creek	69	62	43
Toquerville	188	2	4
Twin Peaks	1,112	1	11
Virgin	136	1	2
Veyo	342	2	7
White Dome	100	93	93
CUSTODIAL			
Airport	7	100	7
Box Canyon	48	100	48
Coalpits	49	14	7
Fault	37	41	15
Herd House	33	100	33
Hurricane	12	100	12
North Grafton	12	100	12
Sand Hills	28	35	10
Sand Wash Reservoir	13	25	3
Snows Holding Pasture	140	2	3
White Dome	8	100	8

GLOSSARY

Acre-Foot. A volume that will cover an area of one acre to a depth of 1 foot (43,560 cubic feet).

Aesthetics. Dealing with the nature of the beautiful and with judgments concerning beauty.

Allotment. An area of land where one or more operators graze their livestock. Generally consists of public land but may include parcels of private or state lands. The number of livestock and season of use are stipulated for each allotment. An allotment may consist of several pastures or be only one pasture.

Allotment Management Plan (AMP). A concisely written program of livestock grazing management, including supportive measures, if required, designed to attain specific management goals in a grazing allotment.

Alluvial. Relating to or formed by materials washed from precipitous mountain slopes and then deposited.

Annual Plant. A plant that completes its life cycle and dies in 1 year or less.

Aquifer. A water-bearing bed or stratum of permeable rock, sand or gravel capable of yielding considerable quantities of water.

Aspect. The orientation of a slope in respect to the compass; a position facing or fronting a particular direction. The general appearance of a vegetative type.

Animal Unit Month (AUM). The amount of forage required to sustain the equivalent of 1 cow or 5 sheep for 1 month.

AUM Capital Value. Economic value reflected in the open market for an AUM of forage.

Base Property. Those lands in a ranching enterprise which are owned or under long-term control of the operator and have the capability to sustain the number of livestock for a specified time period for which a grazing privilege is sought (base property requirement).

Base Property Qualifications. Those qualifications or privileges which are directly attached to or supported by base property. The maximum amount of grazing privileges on Federal range property allowable to base properties.

G

Biochemical Oxygen Demand (BOD). A measure of the amount of dissolved oxygen that will be required from water during the bacterial assimilation of organic pollutants. Generally, a 5-day arithmetic average and reported as mg/l.

Biome. A major biotic community; natural groups of organisms characterized by the occurrence of certain plants and animals that are dominant or influential.

Browse. As a noun, the tender shoots, twigs, and leaves of trees and shrubs often used as food by cattle, deer, elk, and other animals. As a verb, to consume, feed, or eat.

Carnivore. A biological system which acquires life-sustaining nutrients by utilizing animals as food.

Carrying Capacity. The maximum stocking rate possible without inducing damage to vegetation or related resources such as watershed. This incorporates such things as the suitability of the range to grazing as well as the proper use which can be made on each and all the plants within the area. Normally expressed in terms of acres per animal unit month (AC/AUM) or sometimes referred to as the total AUMs that are available in any given area such as an allotment. Areas that are unsuitable for livestock use are not computed in the carrying capacity. This may or may not be the same as the stocking rate.

Catchment. A structure built to collect and retain water.

Climax Community. The final vegetative community which emerges after a series of successive vegetational stages and perpetuates itself indefinitely unless disturbed by outside forces.

Coliform. A general term for the group of bacteria which comprise all of the aerobic and facultatively anaerobic, gramnegative (type of strain related to cell wall composition) nonspore-forming, rod-shaped bacteria which ferment lactose (millsugar) with gas formation within 48 hours at 35 degrees C.

Community. An aggregate of organisms which form a distinct ecological unit. Such a unit may be defined in terms of plants, animals, or both.

Cool-Season Plant. A plant which generally makes the major portion of its growth during the late winter and spring.

Critical Wildlife Habitat. That portion of the living area of a wildlife species that is essential to the survival and perpetuation of the species either as individuals or as a population.

Cultural Resources. Those resources of historical, archaeological, or architectural significance which are fragile, limited, and non-renewable portions of the human environment.

Current Year's Growth. The amount of vegetative growth that occurs in the period of one year.

Custodial Management. This management component does not propose an AMP. It regulates livestock use on a range area where public land is interspersed with private land, assuring the trust guardianship and preservation of public lands is upheld. Objectives of this type of management might be attained without constructing range developments. The responsibility of BLM to manage thes lands according to Sec. 302 of FLPMA, 1976 would not be diminished.

Deferred Rotation Grazing. Discontinuance of grazing on various parts of a range in succeding years, allowing each part to rest successively during the growing season to permit seed production, establishment of seedlings, or restoration of plant vigor. Two, but usually 3 or more separate units are required. Control is usually insured by unit fencing, but may be obtained by camp unit herding.

Desirable Plants. Those plants which are palatable and productive forage species, often are dominant under climax or near climax conditions. They are normally long-lived plants which can include grasses, forbs, and browse. These plants are to be maintained or increased by intensive livestock management.

Disjunct. Marked by separation of or from usually contiguous parts or individuals.

Dissolved Oxygen (DO). Perhaps the most commonly employed measurement of water quality. Low DO levels adversely affect fish and other aquatic life. The total absence of DO will lead to the development of an anaerobic condition with the eventual development of odor and aesthetic problems. Ideal DO for fish life is between 7 and 9 mg/ℓ. Critical levels of DO for nearly all fish are between 3 and 6 mg/ℓ. Most fish cannot survive when DO falls below 3 mg/ℓ.

Ecosystem. Complex self-sustaining natural system which includes living and nonliving components of the environment and the interactions that bind them together. Its functioning involves the circulation of matter and energy between organisms and their environment.

Edaphic. The chemical and physical characteristics of a given water and soil environment without reference to climate.

Endemic. A species restricted to a given geographical location. Native species to a given locale.

Evapotranspiration. The total water loss from the soil, including that by direct evaporation and that by transpiration from the surfaces of plants.

Exchange of Use. An agreement made with a licensee having ownership or control of nonfederal land interspersed and grazed in conjunction with surrounding federal range. This agreement specifies the carrying capacity and gives the Bureau control of the nonfederal land for grazing purposes.

Fair Condition. A range is in fair condition if the plant composition is 15 to 39 percent of desirable and intermediate species with 5 or more percent made up of desirable species. Soil surface factor (SSF) is less than 60. Also, those ecosystems where the composition comprises 60 percent or more of intermediate species and less than 5 percent desirable species are present will be rated "fair" when SSF is less than 60.1. The actual parent compositions by species is determined by paced transect and ocular reconnaissance procedures. Soil surface factor is determined by an onsite investigation and evaluation.

Fertility, Soil. Refers to the status of a soil with respect to the amount and availability to plants of elements necessary for plant growth.

Forage. Vegetation of all forms available for animal consumption.

Forb. A broadleaved herb other than grass; a weed.

Frail or Fragile Lands. Areas which exhibit low vegetation productivity and soil stability. Surface disturbance readily accelerates erosion of these areas. Soil surface factors (SSF) are in excess of 60 or in the critical or severe erosion condition classes. Because of excessive erosion, loss of top soil, fertility and inadequate plant cover, these areas generally have limited potential for improvement beyond any real potential to improve under proper livestock management.

Good Range Condition. A range is in good condition if plant composition is 40 percent or more of both desirable and intermediate species with at least 20 percent of the composition made up of desirable species and has a SSF less than 40. Species composition is determined using paced transects and ocular reconnaissance procedures and the SSF is determined directly through field investigation and evaluation.

Grazing Cycle. The number of years required to apply all of the treatments in the grazing formula to each pasture of the allotment. In other words, it is the completion of 1 full cycle of yearly schedules back to the point of beginning.

Grazing System. A systematic sequence of grazing use and nonuse of an allotment to reach identified multiple use goals or objectives by improving the quality and quantity of the vegetation.

Guzzlers. A water collection development designed for wildlife, especially birds.

Habitat. A specific set of physical conditions that surround the single species, a group of species, or a large community. In wildlife management, the major components of habitat are considered to be food, water, cover, and living space.

Headbox. A structure of wood and/or concrete surrounding and protecting a spring or well.

Hedging. The persistant browsing of terminal buds of browse species causing excessive lateral branching and a reduction in upward growth.

Herb. A seed-producing plant that does not develop persistant woody tissue.

Herbage. Herbaceous plant growth especially fleshy, edible parts.

Infiltration. The flow of a liquid into a substance through pores or other openings, connoting flow into a soil in contradistinction to the word percolation which connotes flow through a porous substance.

Infiltration Rate. Characteristic describing the maximum rate at which water can enter the soil under specific conditions including the presence of excess water.

Insectivorous. Organisms which consume insects as a food source.

Intensity of Use. Amount of vegetation consumed by grazing herbivores over a given time period.

Immediate Plants. Plants are secondary importance in the climax condition. They replace the desirables as condition deteriorates and replace the least desirable plants as range condition improves. These plants may be less palatable to grazing animals or be more resistent to grazing use.

Key Species. A plant that is a relatively or potentially abundant species. It should be able to endure moderately close grazing, and serve as an indicator of changes occurring in the vegetational complex. The key species is an important vegetative component that if overused, will have a significant effect on watershed conditions,

grazing capacity, or other resource values. More than 1 key species may be selected on an allotment. For example, a species may be important for watershed protection, and a different species may be important for livestock forage or wildlife forage, etc.

License. An authorization which permits the grazing of a specified number and class of livestock on a designated area of grazing district lands for a period of time, usually not in excess of 1 year.

Litter. A surface layer of organic debris consisting of freshly fallen or slightly decomposed organic material. Litter is essential because it covers and protects the soil, reduces runoff rates, increases infiltration, and because it is continually being broken down, it yields organic matter which improves soil fertility.

Loam. A soil in which both fine particles (silt and clay) and coarse (sand) sizes are found.

Macroinvertebrate. Large animals; invertebrate.

Management Framework Plan (MFP). Land use plan for public lands which provides a set of goals, objectives and constraints for a specific planning area; a guide to the development of detailed plans for the management of each resource.

Ocular Reconnaissance Survey. A forage survey method which inventories vegetation by estimating total forage density, percent composition by species and total usable forage in a given range type to determine the carrying capacity for livestock and wildlife. All of the range surveys in Washington County utilized this method of survey to determine carrying capacity.

Off-Road Vehicle (ORV). Any motorized vehicle designed for or capable of cross-country travel on or immediately over land, water, sand, snow, ice, marsh, swampland or other terrain.

Pace Transects (Toe-Pace). A method of inventory which utilizes a transect consisting of at least 100 paces (approximately 600 feet in length). With each pace, a "hit" is recorded which must fall either in a notch or on a mark on the toe of your boot. The hit is recorded as to whether it was on bare soil, litter, rock, or vegetation. If on vegetation the hit is recorded by species. Canopy hits on shrubs and basal hits on grasses are recorded. Transects are established to represent specific conditions within the vegetative subtype and represent ground cover characteristics within a part of the area comprising a particular vegetation unit. Each transect location and the number of transects taken depends on

vegetational variance, aspect, plant composition, slope, exposure, and erosion condition. These transects are used to supply resource information for range survey and carrying capacity computations, range condition determinations, and to quantify specific management objectives for measurement and attainment in the AMP. They are most often used in connection with the ocular reconnaissance method and serve to calibrate and supplement that procedure.

Palatability. The relish with which a particular plant species or part is consumed by an animal. The palatability of a plant is usually related to its ecological significance as far as succession is concerned. That is, highly palatable plants are usually those which are a desirable species and decrease with increasing grazing pressure. Conversely, a low palatability usually characterizes a species which is least desirable and increases with increasing grazing pressure.

Paleoecological. The study of ancient or prehistoric ecology.

Pasture. A subdivision of a grazing allotment.

Pellet Groups. A group of fecal material defecated by an animal at one time.

Percent Use. Grazing use of current growth, usually expressed as a percent of weight removed.

Perennial Plant. A plant that has a life cycle of 3 or more years. Because of their longevity, it is desirable to base management on these species.

Permeability. Capacity for transmitting a fluid. It is measured by the rate at which a fluid of standard viscosity can move through material in a given interval of time under a given hydraulic gradient.

Permeability, Soil. The ease with which gases, liquids, or plant roots penetrate or pass through a layer of soil.

Permit. An authorization which allows grazing of a specific number and class of livestock on a designated area of grazing district lands during specified seasons each year for a period of usually 10 years.

pH. The negative logarithm of the hydronium ion (H_3O+) concentration. H_3O+ is commonly referred to as the hydrogen ion (H+) and is reported as the hydrogen ion concentration. A high pH value reflects a low H+ concentration (alkaline condition), whereas a low pH reflects a high H+ concentration (acid condition).

Phenology. The science concerned with periodic biological events in their relation to seasonal climatic changes. Plant phenology refers to dates of sprouting, flowering, seed production, and regrowth, as well as other observable occurrences in plant development. Essential in developing a grazing system which will compliment or conform with seasonal plant requirements.

Phreatophyte. Plants using large amounts of water; habitually sending roots down and absorbing water from the water table or other permanent ground water supply.

Plant Vigor. The relative well being and health of a plant as reflected by its ability to manufacture sufficient food for growth and maintenance.

Profile (Soil). The series of superimposed layers of horizons in the soil.

Proper Use. A degree and time of use of current year's growth which if continued will either maintain or improve the range condition consistent with conservation or other natural resources. Proper use can be controlled by management to meet the physiological and phenological requirements for plant growth.

Proper Grazing Capacity. A degree and time of grazing of current year's growth which if continued will either maintain or improve the range condition consistent with conservation or other natural resources. Proper grazing can be controlled by management to meet the physiological and phenological requirements for plant growth.

Public Lands. Tracts of land administered by the Bureau of Land Management. Formerly called national resource lands or public domain.

Range Condition. In this case should be referred to as grazing condition. Grazing condition is based on the percent of desirable forage in the composition for livestock and the existing erosion condition of a site. Condition of the range must include consideration of vegetation quality and quantity and soil erosion characteristics. Present range condition is determined by direct field examination which includes transect and ocular reconnaissance procedures as well as determination of the soil surface factor (SSF).

Range Trend. This is the change in vegetation and soil characteristics as a direct result of environmental factors, primarily climate and grazing. Studies in range trend are used in combination with other studies to evaluate allotment management plans and grazing systems. Trend data is collected on key areas and relies on key species to represent the pasture or allotment. A trend index is used in

evaluating trend data. This index is computed by adding the following factors: composition of key species, total cover of key species, number of seedings of key species, and percent litter in entire plot. Any change in range trend is reflected by a corresponding rise or decline in the trend index.

Raptors. An order of birds of prey such as the eagle, hawk, owl, and vulture.

Replication. Repetition of experiments under controlled conditions to obtain a specific result.

Rest. Refers to seasonal resting from grazing of a range to allow plants to replenish their food reserves, allow seeds to ripen, seedlings to become established, and allow litter to accumulate between plants.

Riparian Vegetation. Plants that are adapted to moist growing conditions found along waterways, ponds and generally moist environments.

SCS Range Site. A range site is a distinctive kind of rangeland that differs from other kinds of rangeland in its ability to produce a characteristic natural plant community. A range site is the product of all the environmental factors responsible for its development. It is capable of supporting a native plant community typified by an association of species that differs from that of other range sites in the kind or proportion of species or in total production.

Season Long Use. Grazing use made during an entire season such as summer or winter. Usually the same use is made each year.

Soil Association. A group of defined and named taxonomic soil units occurring together in individual and characteristic patterns over a geographic region. Comparable to plant associations in many ways.

Soil Classification. The systematic arrangements of soils into classes in one or more categories or levels of classification for a specific objective. Broad groupings are made on the basis of general characteristics and subdivisions on the basis of more detailed differences in specific properties.

Soil Surface Factor (SSF). A numerical expression of surface erosion activity caused by wind and water as reflected by soil movement, surface litter, erosion pavement, pedcatalling, rills, flow patterns, and gullies. Values may vary from 0 for no erosion to 100 for severe erosion conditions. A determination of the SSF is made directly in the field by evaluating each of the above factors.

Specific Conductance. The ability of a cube 1 centimeter on a side to conduct an electrical current. It is a function of temperature, type of ions present, and concentrations of various ions. Estimates the chemical quality of water samples.

Stocking Rate. The degree to which a grazing unit is stocked with livestock, usually expressed in AUMs. The stocking rate may be more or less than the carrying capacity.

Succulent. Having fleshy or juicy tissues.

Suspended Solids. A dispersion of solid particles in a liquid.

Sustained Yield. The achievement and maintenance in perpetuity of a high level, annual or regular period output of the various renewable resources of land without impairment of the productivity of the land and its environmental values.

Trespass. The grazing of livestock on a range area without proper authority, and resulting from a negligent or willful act.

Unallotted Lands. Those lands not allocated to a specific use.

Undesirable Plants. Consist principally of invaders, noxious, and low value forage plants. The aim in management is to improve range condition to a point where these species are replaced by desirable or intermediate species.

Undulating. Having a form or outline like that of waves.

Unit Resource Analysis (URA). A comprehensive display of physical resource data and an analysis of the current use, production, condition and trend of the resource and the potentials and opportunities within a planning unit, including a profile of ecological values.

Utilization. The proportion of the current year's forage production that is consumed or destroyed by grazing animals. This may refer either to a single species or to the whole vegeative complex. Utilization is expressed as a percent by weight, height, or numbers within reach of the grazine animal. The percent utilization largely determines whether the productivity of the range will be lowered or improved and thus directly influences range trend and condition. Since utilization data actually records the effect of livestock grazing on the vegetation and related resources, particularly for watershed, it is possible to determine the correct grazing capacity directly from utilization information. Any adjustments in carrying capacity will be in direct proportion to the utilization desired by the following formula:

$$\frac{\text{Average Percent Utilization (present)}}{\text{Desired Utilization (if properly used)}} = \frac{\text{AUMs use at present (actual use)}}{\text{AUMs to obtain desired use}}$$

When this relationship is used in calculating carrying capacity, both utilization data and actual use information is examined for the same period.

Vegetative Conditional Trend. A description of the current status and estimated future improvement or deterioration of the vegetation.

Vegetative Type. A plant community with distinguishable characteristics. A more or less distinct vegetation unit which may be delineated on the basis of aspect, composition, or density.

Warm Season Plant. A plant which makes most or all of its growth during the summer or fall and is usually dormant in winter.

LIST OF ABBREVIATIONS

AMP	-	Allotment Management Plan
AUM	-	Animal Unit Month
BLM	-	Bureau of Land Management
BPQ	-	Base Property Qualification
BuRec	-	Bureau of Reclamation
DWR	-	Division of Wildlife Resources
ES	-	Environmental Statement
ft^3/s	-	Cubic foot per second
MFP	-	Management Framework Plan
mg/ℓ	-	Miligram per liter
mℓ/MPN	-	Milliliter Per Most Probable Number
NEPA	-	National Environmental Policy Act
ORV	-	Off-road vehicle
SCS	-	Soil Conservation Service
T&E	-	Threatened and Endangered
URA	-	Unit Resource Analysis
VRM	-	Visual Resource Management

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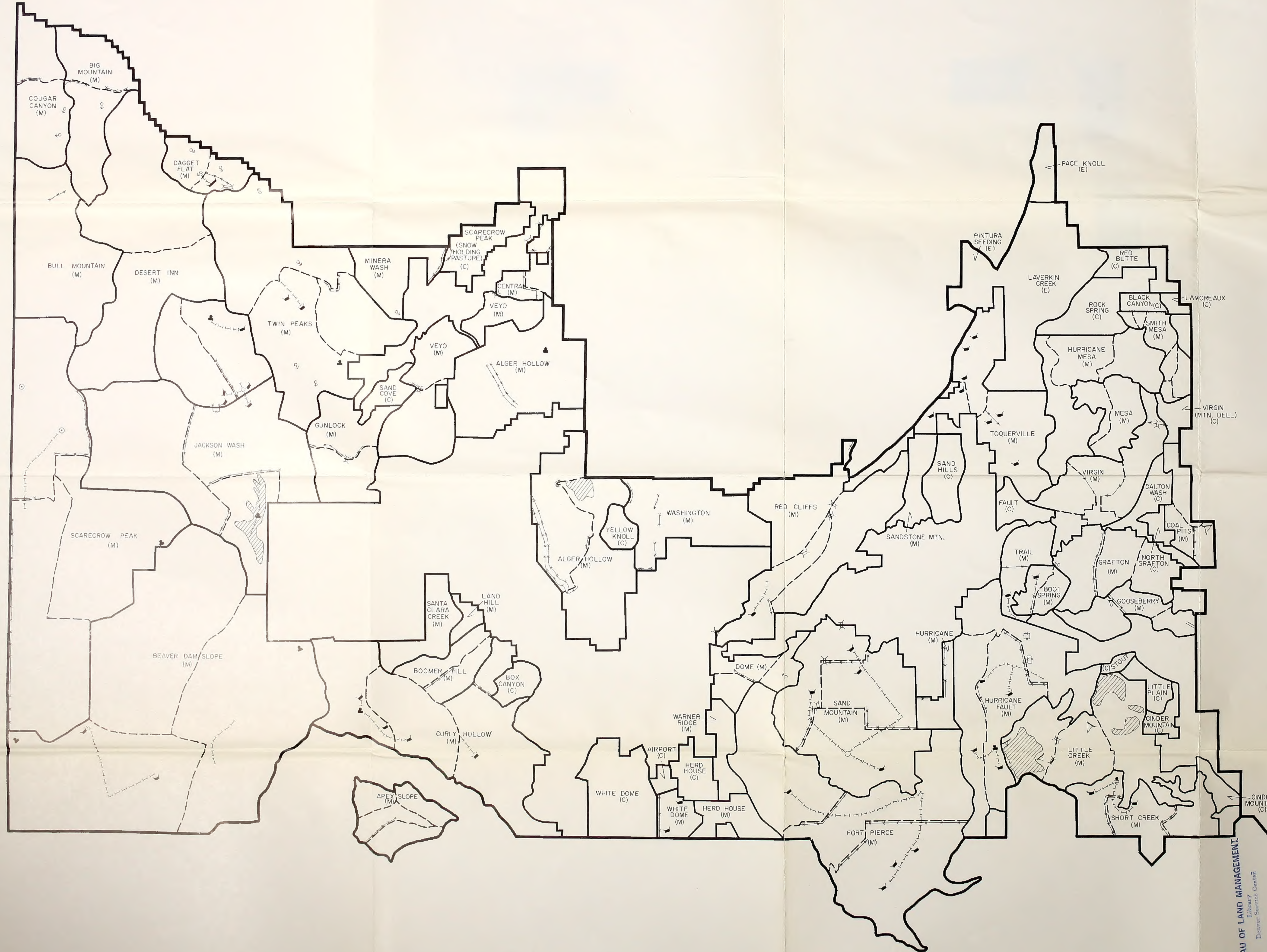
☆ U. S. GOVERNMENT PRINTING OFFICE : 1978 O - 272-657



BOUNDARIES
E.S. AREA
PROPOSED ALLOTMENTS
PROPOSED PASTURES

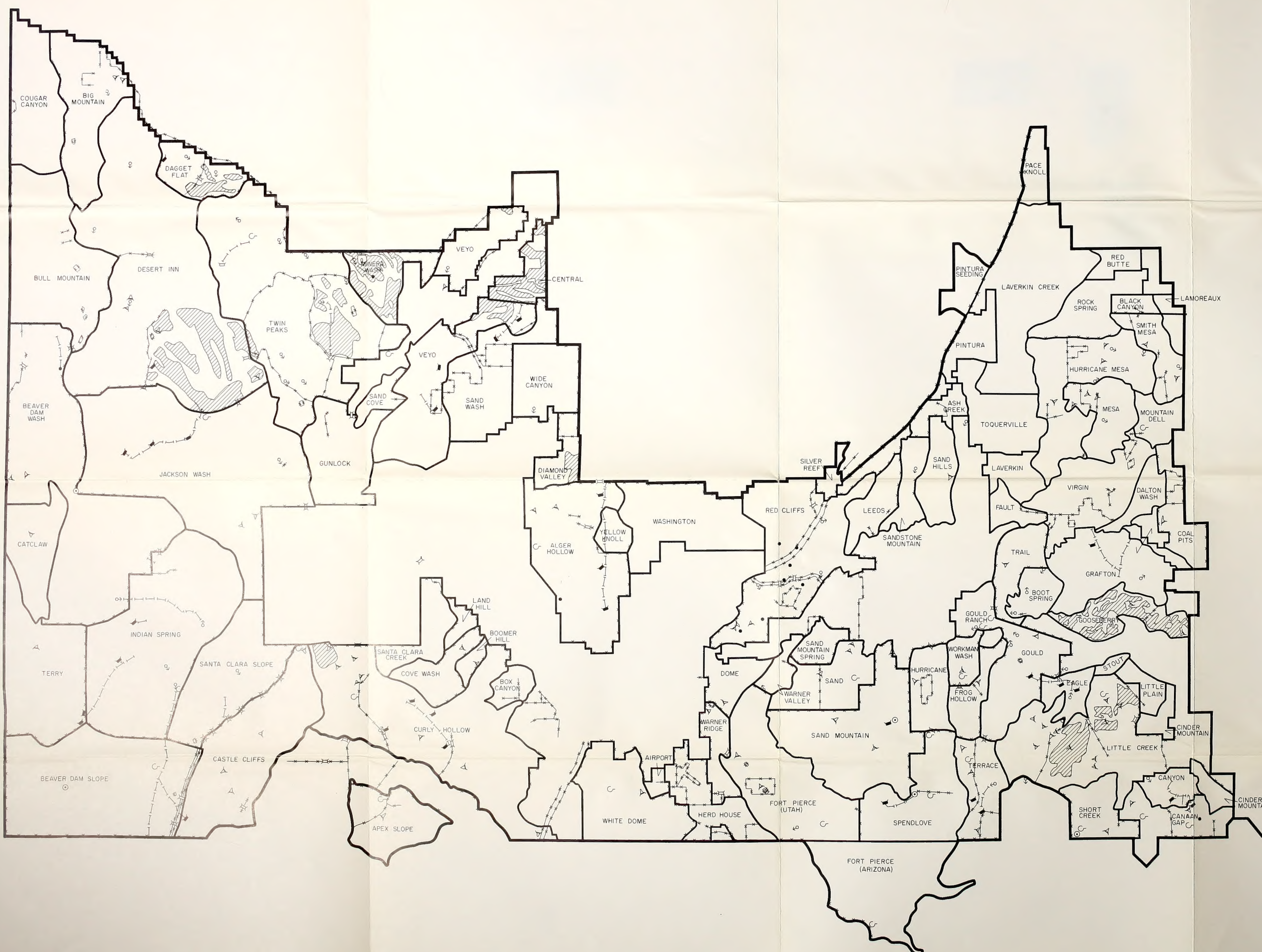
PROPOSED DEVELOPMENTS
PIPELINE
CATTLEGUARD
SPRING DEVELOPMENT
WELL
WATER CATCHMENT
TROUGH
FENCE
RESERVOIR
SEEDING (CHAIN OR DISK)
TRAIL

PROPOSAL COMPONENTS
(M) MANAGEMENT SYSTEM
(C) CUSTODIAL
(E) ELIMINATION OF GRAZING

NOTE: TABLE 1-10 SHOWS SPECIFIC GRAZING SYSTEMS, SEASON OF USE, AND RANGE DEVELOPMENTS FOR PROPOSED ALLOTMENTS.

PROPOSED ALLOTMENTS AND DEVELOPMENTS

FIGURE 1-2



BOUNDARY

- E.S. AREA
- EXISTING ALLOTMENTS

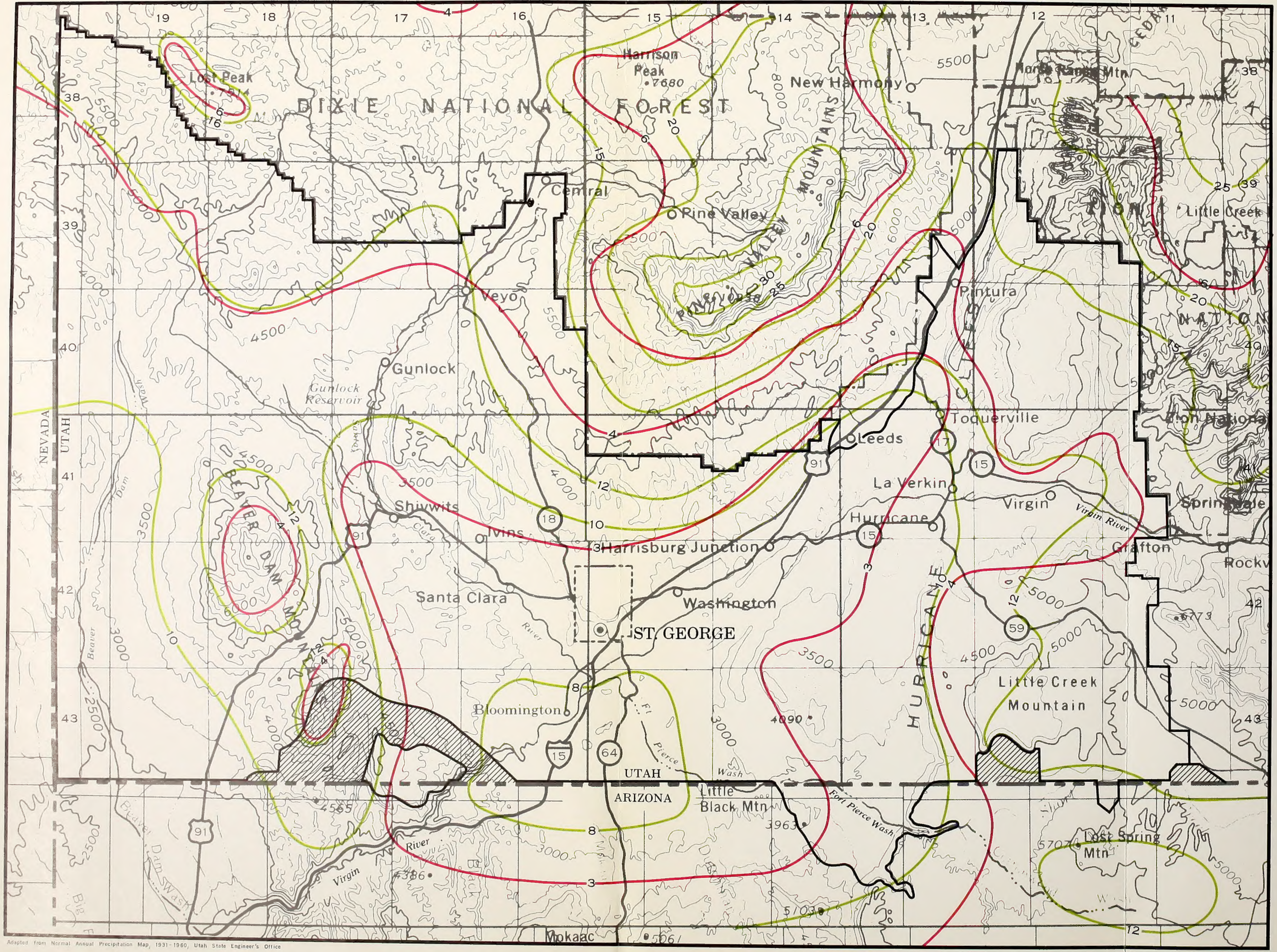
EXISTING DEVELOPMENTS

- PIPELINE
- CATTLEGUARD
- SPRING DEVELOPMENT
- WELL
- TROUGH
- TANK
- FENCE
- RESERVOIR
- SEEDING
- CORRAL

EXISTING ALLOTMENT AND DEVELOPMENTS

FIGURE 2-23

HOT DESERT ES



Adapted from Normal Annual Precipitation Map, 1931-1960, Utah State Engineer's Office

N

Scale in Miles

LEGEND

NORMAL ANNUAL PRECIPITATION

NORMAL MAY–SEPTEMBER PRECIPITATION

NUMBERS INDICATE AVERAGE ANNUAL INCHES OF PRECIPITATION

EXCLUDED AREAS

FIGURE 2–1

ANNUAL PRECIPITATION

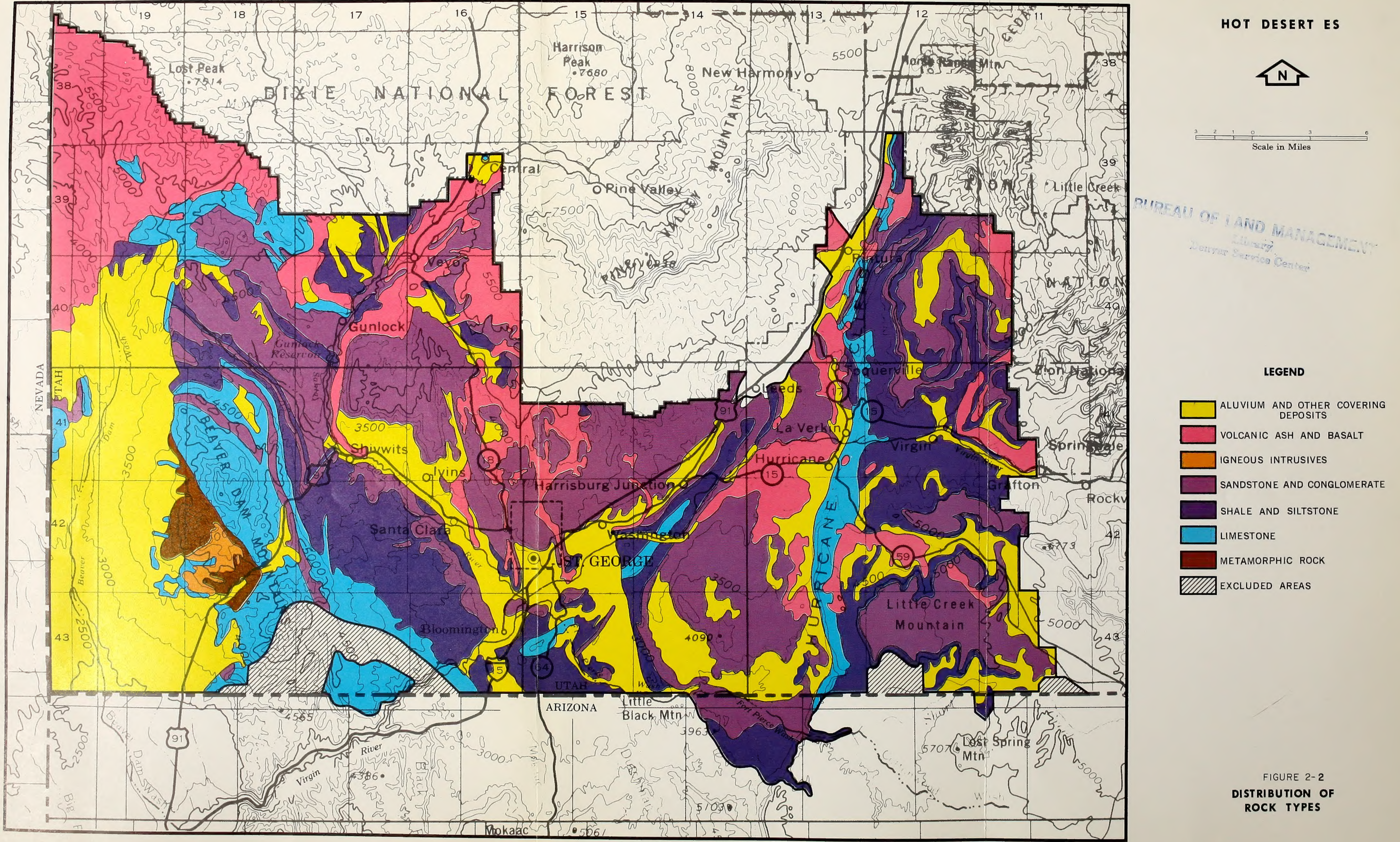
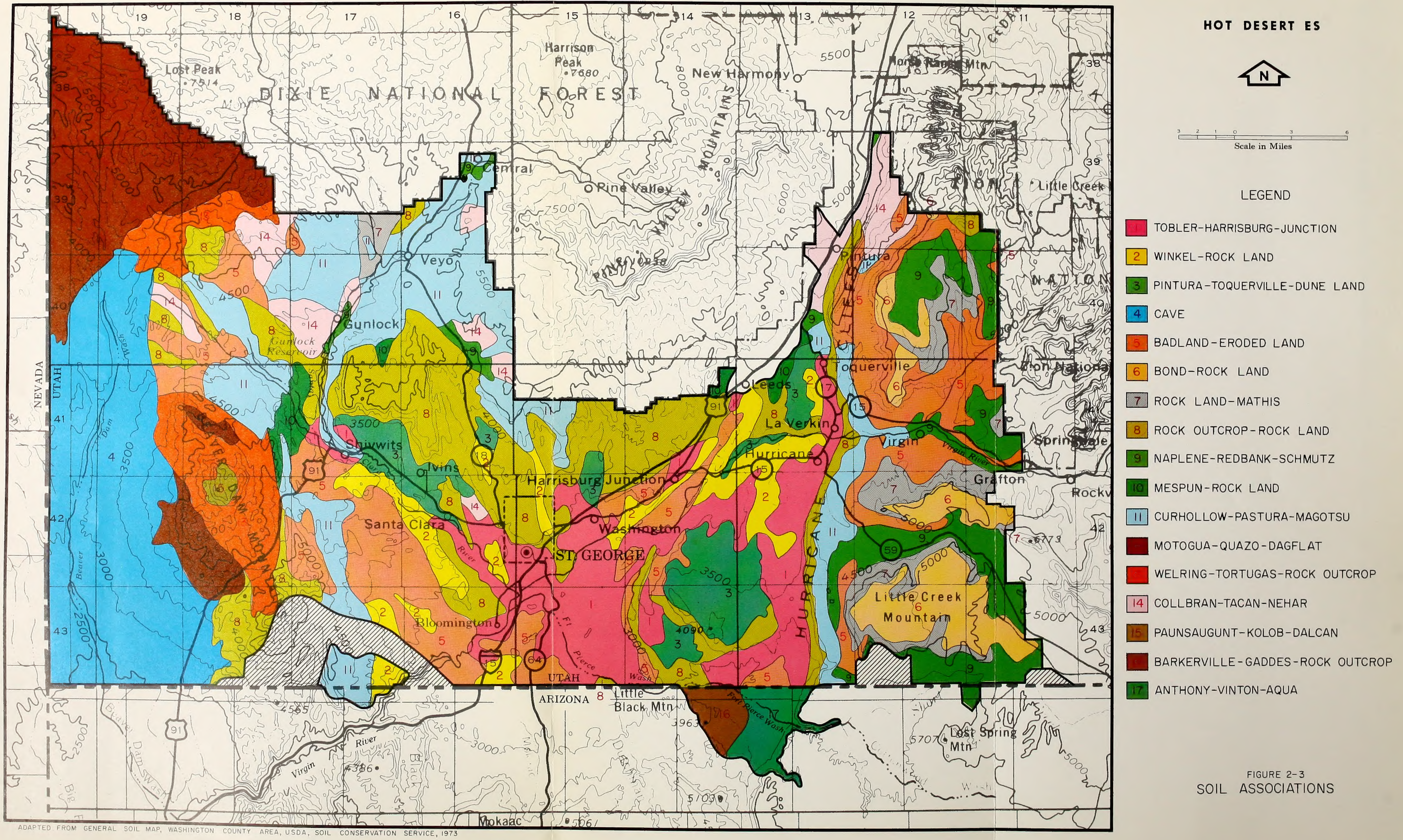
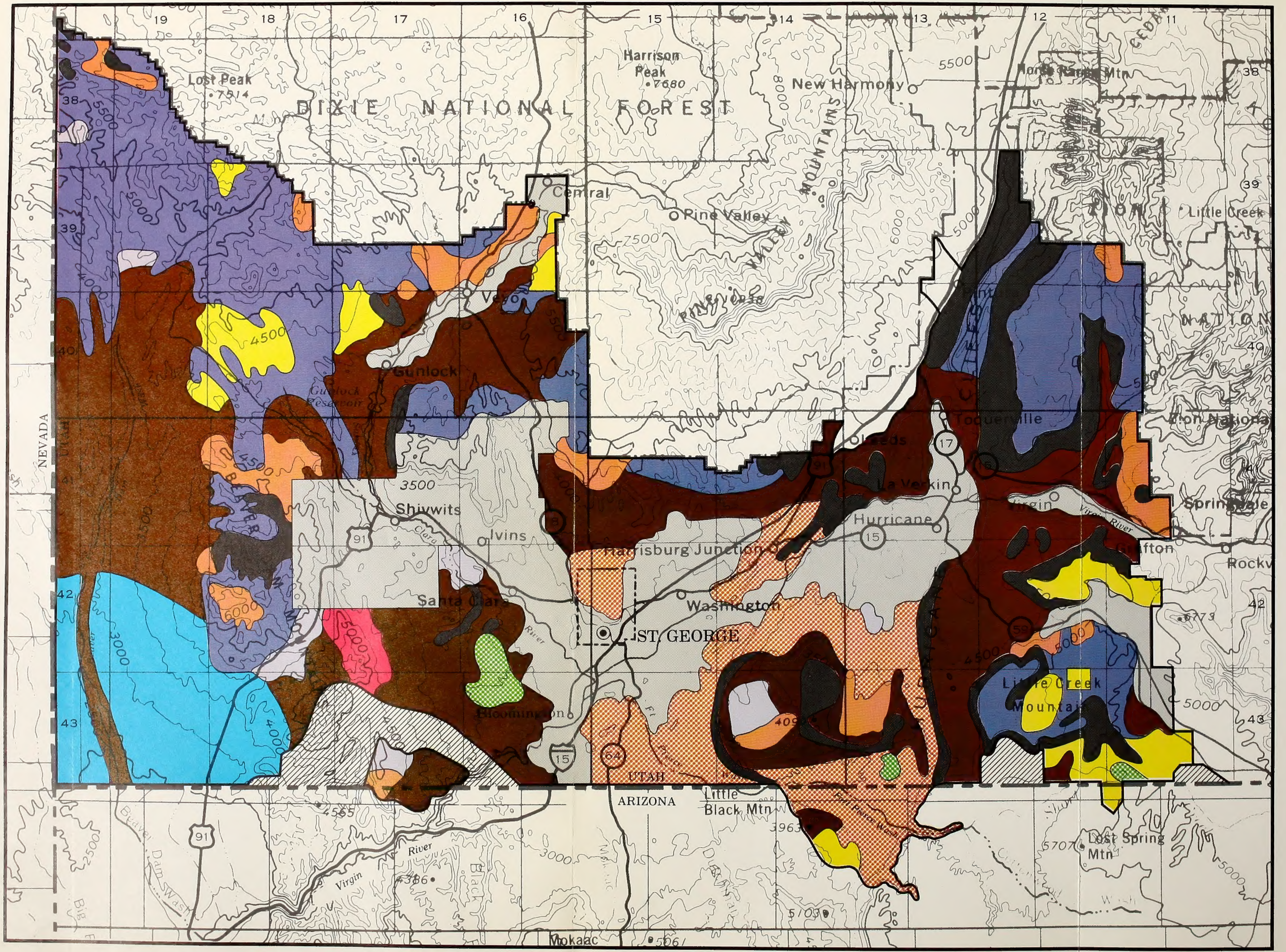


FIGURE 2-2
DISTRIBUTION OF ROCK TYPES


HOT DESERT ES
N
Scale in Miles
LEGEND
1 TOBLER-HARRISBURG-JUNCTION
2 WINKEL-ROCK LAND
3 PINTURA-TOQUERVILLE-DUNE LAND
4 CAVE
5 BADLAND-ERODED LAND
6 BOND-ROCK LAND
7 ROCK LAND-MATHIS
8 ROCK OUTCROP-ROCK LAND
9 NAPLENE-REDBANK-SCHMUTZ
10 MESPUN-ROCK LAND
11 CURHOLLOW-PASTURA-MAGOTSU
12 MOTOGUA-QUAZO-DAGFLAT
13 WELRING-TORTUGAS-ROCK OUTCROP
14 COLLBRAN-TACAN-NEHAR
15 PAUNSAUGUNT-KOLOB-DALCAN
16 BARKERVILLE-GADDES-ROCK OUTCROP
17 ANTHONY-VINTON-AQUA
DIXIE NATIONAL FOREST
Lost Peak
Harrison Peak
New Harmony
Central
Pine Valley
Veyo
Gunlock
Gunlock Reservoir
Shivwits
Ivins
Santa Clara
Harrisburg Junction
Washington
ST. GEORGE
Bloomington
Leeds
La Verkin
Toquerville
Hurricane
Pintura
Virgin
Grafton
Springdale
Little Creek
Little Creek Mountain
Little Black Mtn
Lost Spring Mtn
HURRICANE
NEVADA
UTAH
ARIZONA
Mokaac
FIGURE 2-3
SOIL ASSOCIATIONS
ADAPTED FROM GENERAL SOIL MAP, WASHINGTON COUNTY AREA, USDA, SOIL CONSERVATION SERVICE, 1973

HOT DESERT ES



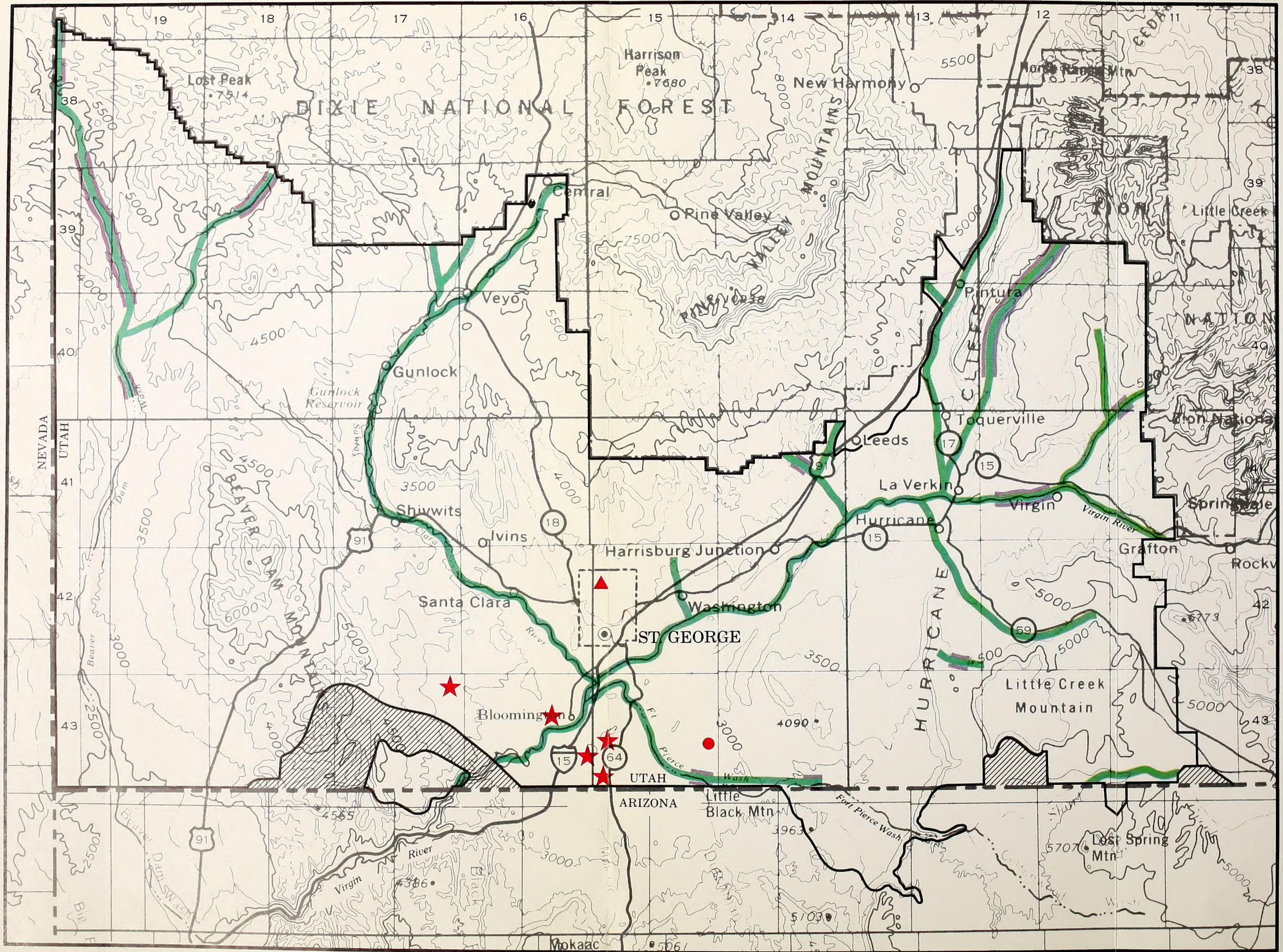
Scale in Miles

LEGEND

- GRASS
- SAGEBRUSH
- PINYON - JUNIPER
- CREOSOTE BUSH
- SALT BUSH
- DESERT SHRUB
- HALF SHRUB
- ANNUAL
- JOSHUA TREES
- WASTE
- EXCLUDED LANDS
- MAJOR AREAS OF PRIVATE LANDS

FIGURE 2-5
VEGETATIVE TYPES

HOT DESERT ES



N

Scale in Miles

LEGEND

RIPARIAN VEGETATION

EXCLUDED LANDS

DISTRIBUTION OF THREATENED AND ENDANGERED PLANTS

★ ARCTOMECON HUMILIS

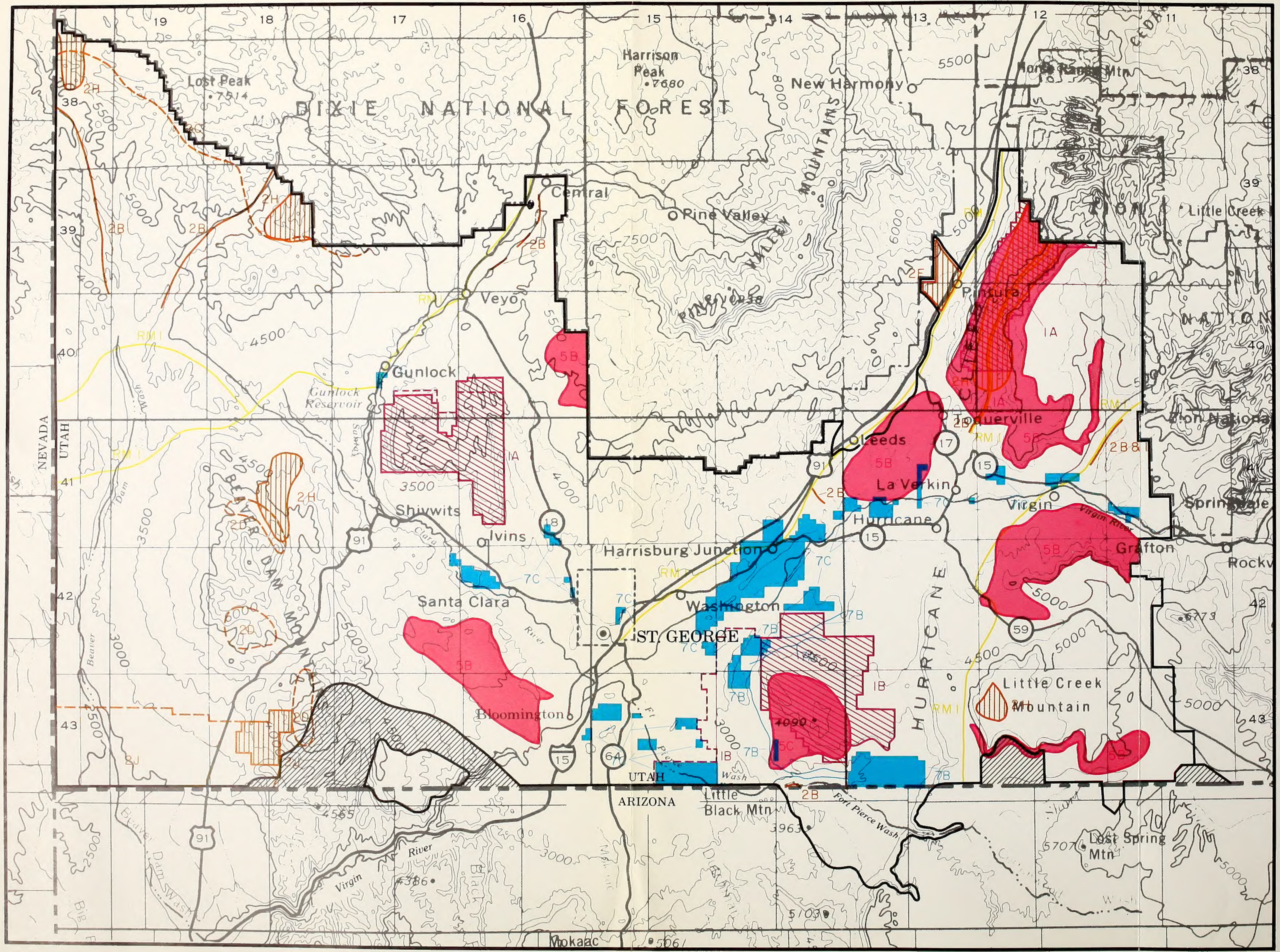
▲ ECHINOCEREUS ENGELMANNII

● PEDIOCACTUS SILERI

PROPOSED MITIGATED AREAS

FIGURE 2-6

RIPARIAN VEGETATION AND THREATENED/ENDANGERED PLANTS



HOT DESERT ES

N

Scale in Miles

WILDLIFE - 2 B,C,D,F,H,I,J

WATERSHED - 5 B,C

LANDS - 7 A,B,C

RANGE MANAGEMENT

RM I LIVESTOCK TRAILS

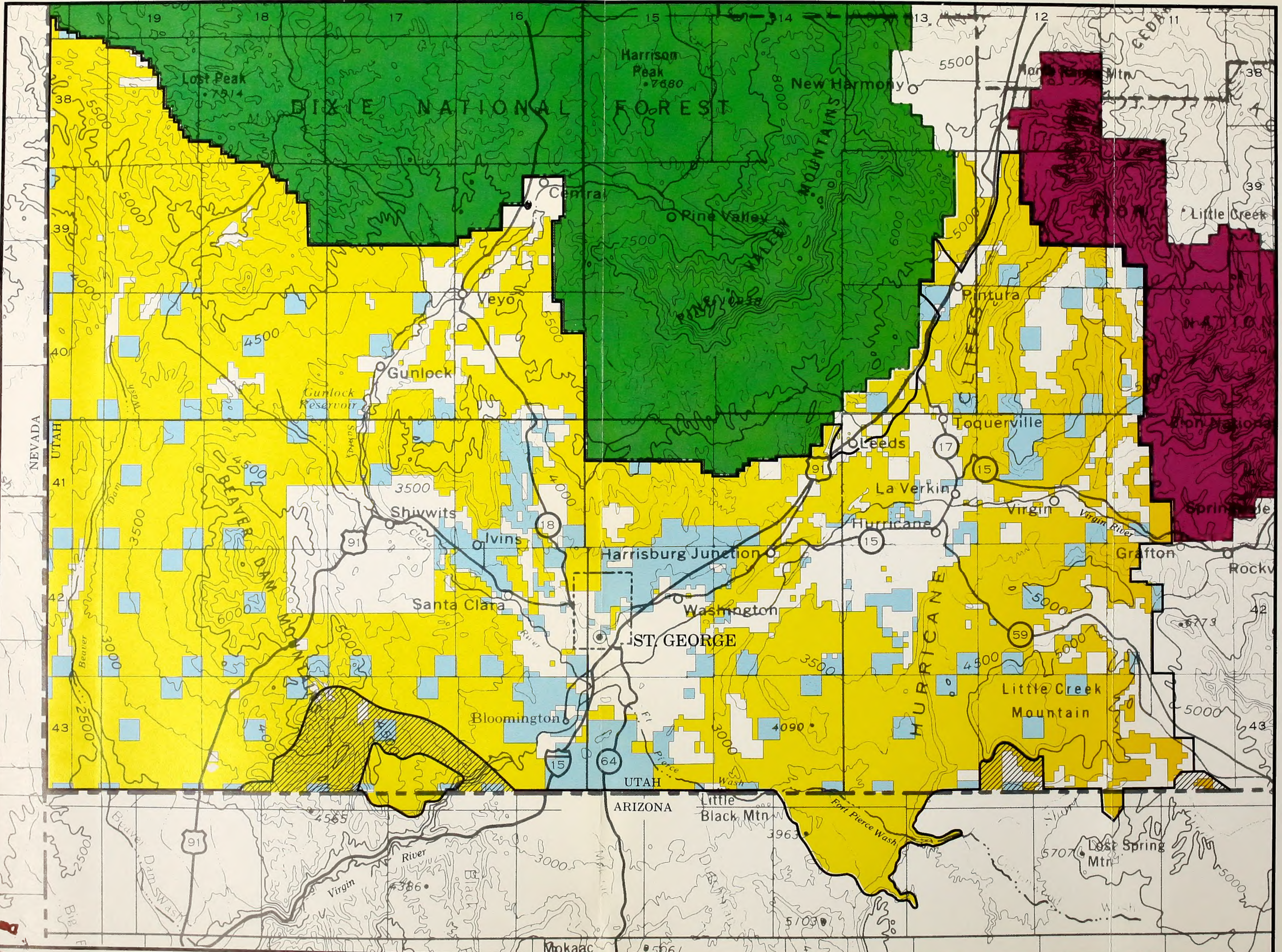
RECREATION - I A,B

MFP DECISIONS (SOLID LINE ENCLOSED AREA)

RECOMMENDATIONS (DASHED LINE ENCLOSED AREA)

FIGURE I-12

VIRGIN RIVER
MFP
SUMMARY MAP



HOT DESERT ES

N

Scale in Miles

LEGEND

- PUBLIC LANDS
- STATE OF UTAH
- PRIVATE
- EXCLUDED LANDS
- ES BOUNDARY

UTAH

Washington County

LOCATION MAP

FIGURE I-13
LAND STATUS